VOLUME XXXVIII Established 1914 NUMBER 5

CHEMICAL INDUSTRIES

MAY, 1936

Consulting Editors

Robert T. Baldwin
L. W. Bass
Frederick M. Becket
Benjamin T. Brooks
J. V. N. Dorr
Charles R. Downs
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CHEMICAL INDUSTRIES is published monthly by Chemical Markets, Inc. WILLIAMS HAYNES, *President*; H. H. ADAMS, *Vice-President*; WILLIAM F. GEORGE, *Secretary-Treasurer.*

Published on the tenth day of each month at New Haven, Conn., and printed for the publishers by The Tuttle, Morehouse & Taylor Company.

Entered as second class matter, December 22, 1934, at the Post Office at New Haven, Conn.. under the act of March 3, 1879.

SUBSCRIPTION RATES: Domestic and Canadian, one year $3.00 in advance; two years, $5.00; three years, $6.00 including CHEMICAL GUIDE-BOOK (issued annually); foreign, $1.00 a year additional; single copies of the current issue are twenty-five cents each, back issues fifty cents each. Notice of three weeks is necessary in order to change subscriber's address, and in notifying, kindly give both the old and new addresses.

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PUBLICATION OFFICE, NEW HAVEN, CONN. EDITORIAL AND ADVERTISING OFFICES, 25 SPRUCE ST., NEW YORK, N. Y.
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Just Published — SEND FOR IT!

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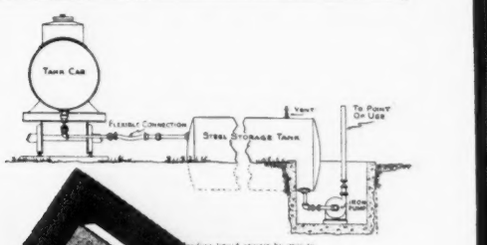

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Cutting Costs with Liquid Caustic Soda

FREE TO PLANT EXECUTIVES AND TECHNICAL MEN

The Table of Contents page, reproduced above, gives an idea of how comprehensive is the data in this new 72-page handbook.

HERE'S a real handbook on liquid caustic soda, packed full of useful information for both present and potential consumers. Its 72-pages contain material of practical value to the entire plant organization — executives, buyers, chemists, operating men—based upon the wide experience of the Mathieson technical staff and upon data gathered from authoritative reference sources. Anyone interested in the use of liquid caustic soda may obtain this book without obligation by writing to us on his business letterhead.

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The Reader Writes:—

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Your stimulating editorial on "Research Costs and Result Values" prompts a desire to own Dr. Fisher's book. By whom was it published. Is it on sale in America?

New York City — C. R. Downs, Weiss & Downs, Inc.

In reply to numerous similar requests, "The Design of Experiments" is published by Oliver & Boyd, Edinburgh, Scotland.

Down But Not Discouraged

I would appreciate it very much if you were to send me another copy of this year's Chemical Guide-Book. Our mill and laboratory were under twelve feet of water during the past flood, and all of our books, including three years' issues of your Chemical Industries, were completely destroyed along with an extensive chemical and magazine library. However, in our library there were no books used as much as your magazine and your Chemical Guide-Book, for we found that in this book we could instantly find such things as we wanted on the spur of the moment. In your monthly magazine, in addition to some very interesting and enlightening reading, we have found that the advertisements are so arranged that the advertisers can be located easily and without effort.

Lawrence, Mass. — J. H. Estes, Fiber Products, Inc.

"When Doctors Disagree"

I was much interested in an article entitled, "Chemical Weed Killers," in Chemical Industries 38: page 169. I also appreciate the complimentary references in connection with my book on weeds.

Referring to my general statements (on pages 70-71 of my book) concerning the use of chemicals for the control of weeds the author of the article states that, ... "these generalizations are now open to some question in the light of the work being done by W. E. Ball and the Crop Protection Institute."

Of course I have been aware of the rapid progress that has been made in chemical weed control during the last decade and is likely to be made in the near future. For this reason I purposely avoided making too dogmatic statements which would need to be revised at once. The work of Ball and his associates in California, on sulfuric acid for killing weeds in grain-fields, in my opinion, does not necessarily alter the general statements which I made. It is true that they contributed one thing, namely, the method of mixing the acid and water by an ejector, outside of the sprayer. The outfit which they devised is workable under the particular conditions under which they were working in California. There is no reason to suppose that this equipment with its enormous weight and expense can be utilized over large areas of cheaper land in other regions.

The superiority of sulfuric acid as a selective spray in grain-fields has been demonstrated over 10 years ago by one of my students, Dr. A. Aslander. We have recommended its use in our extension bulletin on mustard control for the last 8 years. A perusal of the enclosed publications sent under separate cover, will, I believe, indicate that the facts regarding the effectiveness and availability of sulfuric acid as a selective weed killer were known prior to Ball's work along this line. It is true that he has made an important contribution by devising a method of getting the acid on the weeds without running it through the sprayer pump and I do not wish to appear to minimize the importance of this contribution, but I wish I could be as optimistic as is the author of the article concerning the effect of this on the future use of chemical weed killers. This merely represents another opinion but perhaps the author is right. I am glad your journal is interested in the subject.

W. C. Muenscher
Ithaca, N. Y. — Weed Specialist, N. Y. Experiment Station

Wants More Pioneer Articles

Enclosed find check for three years' subscription. Chemical Industries keeps me posted on the effects resulting from the attitude of the Federal Government concerning the chemical industries; a condition that I consider of vital importance in this age. I find no fault with your articles on the latest developments in the industry. The biographies of the pioneers in the chemical industries that were featured in last year's issues were quite interesting, informative and inspirational. More articles of that type would be appreciated, I am sure.

Chicago, Ill. — H. F. Haworth.

The Party's Getting Rough

Why all this fuss and bother about the British Billingham plant? Making gasoline out of coal just does not pay any better than trying to make it out of corn. The Germans and Billy Hale are damned good salesmen. The Imperial Chemical Industries, Ltd., and the Chemical Foundation, Inc., are just high class suckers. Seems to me like you are nearly as dumb writing articles about such dud processes. You take my advice and stop wasting your reader's time with such hooey.

Chicago, Ill. — J. P. Johnson

Praise for the Pioneers

Your ardent work in compiling the series of biographies of the pioneer chemical manufacturers is most praiseworthy. Please accept my heartiest congratulations on the work you have undertaken. I know it is highly appreciated in the chemical trade.

Brooklyn, N. Y. — Alfred C. Klahre.

We Escape A Budget Slash

In reviewing my list of subscriptions this year with a view to eliminations for reasons of expense reduction, I felt I simply could not afford to dispense with Chemical Industries and the stimulation and general contacts with practical problems that it brings me monthly.

W. E. Morgan
New York City — Inecto, Inc.

The Tercentenary Issue

I like especially your Tercentenary issue and still keep it at hand for unoccupied minutes. It alone was worth the year's subscription. In the regular issues, I concentrate on short notices of all kinds and on articles about market and trade conditions. Since this information cannot be found in this comprehensive form in any other place, your magazine certainly fills a need. I read the life stories of men and companies, but I do not bother about long technical articles. Enclosed please find check for a three years' subscription.

Galveston, Tex. — William Kurz.

CHEMICAL INDUSTRIES

VOLUME XXXVIII NUMBER 5

Cost Cutting vs. Price Cutting

PHTHALIC anhydride's commercial story (told with a wealth of interesting and authentic detail in this issue) is a vivid revelation of the secret of our chemical progress. In less than a business generation the price has been reduced nearly 94 per cent. while at the same time the output has grown from a few pounds to a quarter of a billion.

This is the typical story of lower and lower selling price so interwoven with wider and wider uses that it is impossible to unravel cause and effect in this phenomenal development. It is a story that can be told of scores of new chemicals. But it is as true of the oldest and most prosaic of the standard industrials, for we are apt to forget that the yearly output of Harrison's pioneer sulfuric acid plant a century and a half ago was 300 carboys and his price 15¢ a pound. More and more chemicals sold for less and less, yet made profitable through research which increases yields, utilizes cheaper new materials, requires less human labor, uncovers new markets—that is the very core of our modern theory of chemical production.

Competition has forced this kind of progress upon us. No chemical maker dare rest on his laurels because there is no American chemical monopoly in raw materials, in markets, in men. Yet cutting costs is a very different thing from cutting prices, and to pass on to the consumer promptly the results of technological progress is quite a different matter from trying to forestall a competitor in a market where the industrial demand is limited by the hard economic conditions of today.

With a chemical output that stands today at least 20 per cent. over the boom-year production of 1929, this industry of ours gives the nation a living example of the fallacies of the "plough under" theory. It is a record of which we can be proud. It has been made without subsidy or bonus. It has been earned by hard work. It is the result of research.

The Consumer's Point of View

Very little ability "to read between the lines" will enable directors of research and sales managers of companies which supply chemical materials to our pulp and paper industries to learn a great deal from the round table discussion of a dozen leading technologists in this great consuming field which is reported *verbatim* on another page. In the business relationships between supplier and consumer, specific complaint naturally enough is more common than broad criticism. The value of these frank and friendly opinions, held impersonally and delivered most informally, is that the suggestions they contain may be promptly applied to questions of policy unobscured by details of administration or operation.

Pyrethrum as a Chemurgic Crop

This month, the second Farm Chemurgic Council assembles to expound an idea the chemical industries agree is basically sound and highly desirable. But the better and wider chemical use of agricultural products is simpler in theory than in practice; and its proponents should curb their enthusiasm lest they discredit a worthy idea among the industrialists and unwittingly deceive the agriculturists. No agri-chemical enterprise that must be bolstered with subsidies, tariffs, or taxes will be seriously entertained as a commercial proposition by the chemical manufacturer, and the farmer should be told plainly that if he is to become a purveyor of industrial raw materials, he must cast aside all ideas of selling restricted outputs for high prices.

To clarify the chemurgic problems, let us consider a very simple, typical case. Pyrethrum is a farm crop with a fast-growing industrial use as an insecticide. It is a plant that can be grown over large areas of this country. Japan produces 85 per cent. of the world's supply; Dalmatia, original habitat of the commercial plant, about 10 per cent.; and British Kenya, a new producer, about five per cent. Japanese flowers contain no better than one per cent. of pyrethrines, while the active principle in Kenya flowers averages nearly half again as much. A normal crop is some seven million tons; but 1935 produced 12 million tons and estimates for 1936 are as high as 14 million tons. As a result, the New York spot price of 7½¢ per lb. is the lowest on record. Japan, admittedly the low cost producer, gets a yield of about 900 lbs. per acre at a cost of about 7¢ a lb., picked, dried, and baled for shipment.

Here is a big, existing chemurgic market. To make pyrethrum a chemurgic crop the American grower has three alternatives:

1. To cut the costs of a 900 lb. yield below $63 per acre.
2. To raise the yield more than he increases costs on this same basis.
3. To increase (by breeding or selection) the pyrethrine content above 1.4 per cent.

All chemurgic proposals should be reduced to such simple terms and studied, not through rose-colored glasses, but in the fierce glare of competitive conditions. To do less will be a tragic mistake. So very worthy a movement should not at the beginning rouse the distrust of the chemical industry or lose the sympathy of the American farmer. Both are in jeopardy, if proposals are fostered involving unsound chemistry or impractical agriculture and which fail to meet the tests of good business.

Beyond All Other Political Issues

Friends and foes of Mr. Roosevelt agree that he has made important changes in our scheme of government, and both groups prophecy that History will proclaim him famous, or infamous, for the new direction that he has given our political life. This unanimous opinion is doubtless correct; but we cannot afford to wait a century for a verdict, and it is therefore the nation's serious misfortune that so many of these changes are contradictory and exceedingly obscure.

One example (one that touches the chemical industry to the quick) of conflicting, complicated objectives, vastly more serious in import than the trumpery issues which the politicians mouth, is the new attitude towards the American standard of living. The President has made strenuous efforts to raise this standard all aimed at raising prices and wages. At the same time he has greatly raised all our costs by expanding beyond all precedent the costs of Government. Yet while he has been shoving American prices higher and higher above the world level, he has permitted his Secretary of State to whittle away the tariff barrier behind which for a century and half we have been building up that American scale of living he so earnestly wants further to improve.

There are other contradictory theories whose effects are hard to judge that are important beyond all other political issues; but this problem of our price level is most important of all. It affects us all. It is understandable to us all. It should be thought through and then thrashed out. Its correct solution would automatically solve unemployment and social security.

From 138,000 Pounds at $4.23 in 1917

to 12,500 Tons at 14.5 cents per pound

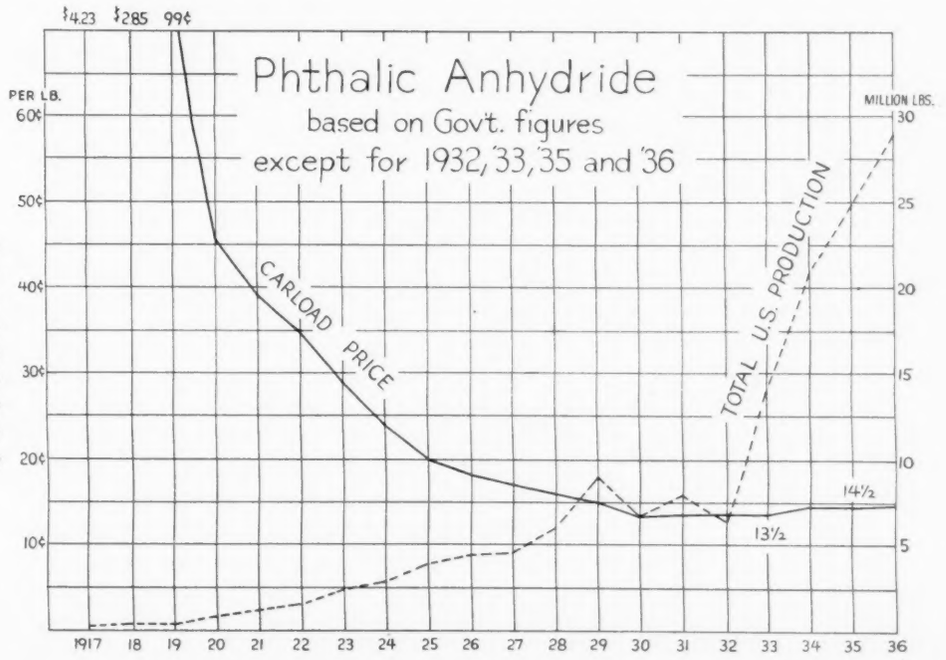
Phthalic Anhydride

By C. R. Caryl

IN 1934, 20,600,000 pounds of phthalic anhydride were produced in the U. S. A., according to the U. S. Census of Dyes, and an estimate of 25,000,000 pounds in 1935 would probably be a fairly close one. These figures emphasize again the increasing importance of this organic chemical and fulfill a prediction which appeared in CHEMICAL MARKETS for April 1927 in "A Decade's Development in Phthalic Anhydride." The author, J. M. Selden, Jr., reviewed the rapid growth in demand for phthalic anhydride from 1917, when 138,000 pounds were produced in this country, to 1927 when production totaled over 4,500,000 pounds. That article concluded "It might be well for no research organization to overlook this moderate priced organic acid, as the development of new processes for the use of phthalic anhydride in the next ten years bids fair to assume large proportions."

The accompanying graph of price and production curves illustrates the growing output of phthalic anhydride and the steadily declining price. While the production curve has not climbed steadily, each time it showed a tendency to flatten out there has been developed a new outlet for Phthalic which resulted in another sharp rise in the curve. For instance, production in '23 and '24 seemed to indicate that the consumption of Phthalic by the dye industry, the only large outlet at that period, had reached the saturation point. The following two years saw an increased output, due largely to the development of uses for the phthalic esters, principally dibutyl phthalate. In '28 and '29, production was again stepped up sharply, due to the increasing demand for the new synthetic resins. Except during the depression, production has increased every year since 1917, with new uses developing as the previous outlets seemed to reach their maximum.

Production of phthalic anhydride by the direct oxidation of naphthalene with air over a catalyst was developed by Gibbs and Conover in September, 1916, in the Color Laboratory of the U. S. Bureau of Chemistry, during the Government's war-time investigation of the manufacture of dyestuffs and intermediates. In 1917, phthalic anhydride had an average market price of $4.23 per pound, the product being made by the sulfuric acid and mercury process. The following year, when phthalic anhydride from the air-oxidation process was first put on the market, the price dropped to an average of $2.85 for the year. Since then, annual increases in output together with process improvements



The price of phthalic anhydride has declined steadily over the past twenty years as the volume of production has mounted. By such progressive action the manufacturers have opened up new fields of consumption. Now phthalic anhydride is one of the most important raw materials in the synthetic resin field.

have justified lower and lower prices, until phthalic anhydride is now the cheapest aromatic organic acid on the market.

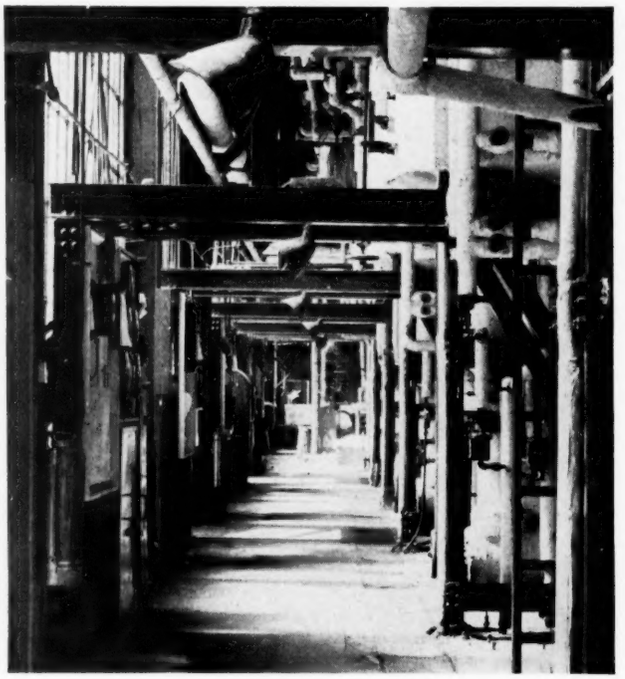
A remarkable coincidence was the development of the same basic process by an inventor in Germany, at almost exactly the same time that Gibbs and Conover made their invention. Alfred Wohl applied in 1920 for a U. S. Patent covering this process, claiming invention in Germany in the summer of 1916. There was some doubt whether his invention had been made two months earlier or three days later than the Gibbs and Conover invention, but in July 1934 the U. S. Court of Customs and Patent Appeals rendered a decision in favor of the German inventor, allowing Wohl's claim filed with the German patent office on June 28, 1916, a document which in our patent office would be considered as a new application. Therefore, Wohl's basic patent covering the air-oxidation process was upheld, and he was granted U. S. Patent No. 1,971,888, issued August 28, 1934, assigned to the German I. G.

The air-oxidation of naphthalene sounds like a very simple reaction. All that is necessary is to vaporize molten naphthalene, mix the vapors with hot air, pass the mixture over a suitable catalyst, and condense the resultant phthalic anhydride, using the heat given off during the reaction to melt more naphthalene and preheat more air. However, the early investigators found out—to their sorrow—that naphthalene had different ideas as to its own behavior. Its preference was not for a dignified union with two oxygen atoms and a change in name to alpha-naphthaquinone, then a break in its first ring, a welcome to one more oxygen atom and another change in name to phthalic anhydride, each time saying farewell to one molecule of water. Not at all. It would not even care to become maleic or benzoic acid. It very much preferred, after being sufficiently heated, to grab all the oxygen within reach and to become carbon dioxide and water, wasting no more time about it than would gasoline. In fact, this preference was strong enough to scatter one of the first plants over a good deal of landscape.

The problem has therefore been largely a delicate matter of heat control. Start the naphthalene burning. But put the fire out at just the right instant, for vapor-phase oxidation and combustion are synonymous. The process for making Phthalic is actually the interrupted combustion of naphthalene.

A technocrat's dream has come true at Bridgeville, Pa., where the Selden Division of American Cyanamid & Chemical Corporation operates the largest Phthalic plant in the world. A minimum of labor and a maximum of equipment are to be seen in the main buildings, and nothing else, no raw materials, no finished product. From floor to high roof, nothing but pipes, valves, compressors, dials, stills and converters, all white with their protective coatings of insulation. The accompanying photographs give some idea of the complexity of this operation. The raw materials, molten naphthalene and compressed air, enter the building in two pipes. The finished product leaves in another pipe, to be finally purified by an exclusive method of sublimation. The finished product is seen for the first time as it leaves the subliming chamber for the shipping barrel, a mass of glistening needle crystals odorless, colorless, chemically pure, and beautiful enough to decorate a Christmas tree. The chemist who knows that the purer the product the larger the crystal, would need no further proof of the foregoing statement if he could see some of the crystals which are over six feet long.

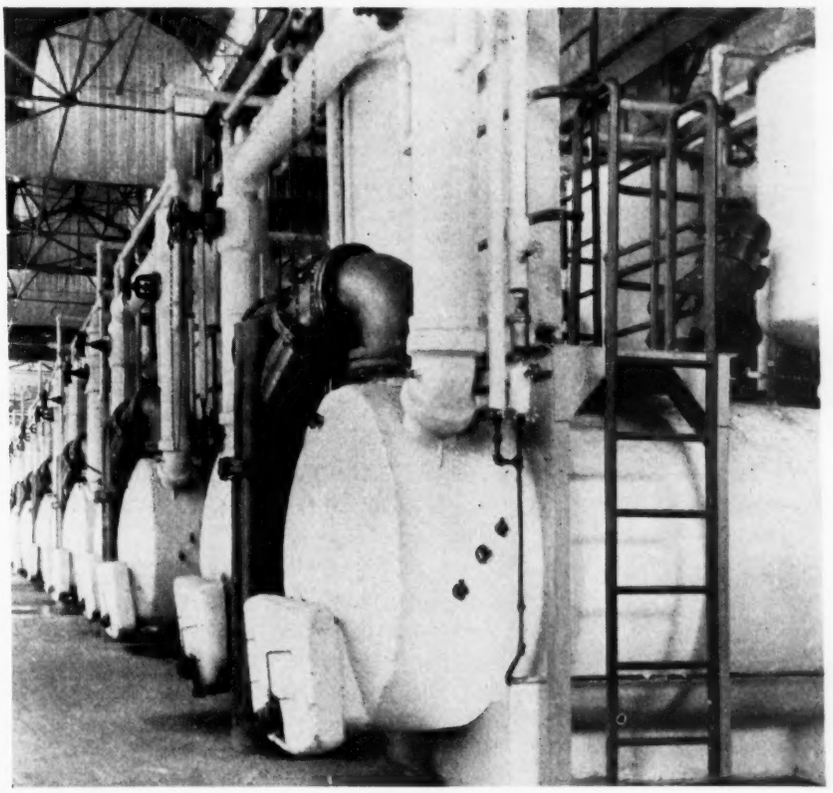
As the crystal form is somewhat bulky for shipping, it is also offered in the form of flakes, made by melting the crystals and chilling the molten material on a drum flaker. Recently the Selden Division of American Cyanamid & Chemical Corporation has developed a new and exclusive form, called Phthaligrains, which consists of small hard grains. These are as free-flowing and dustless as the flakes but since they are porous they react more readily than other forms and command a slight premium in price.



A technocrat's dream comes true at Cyanamid's Bridgeville plant. Every step in the difficult manufacturing operation is watched through control instruments. An aisle in the plant showing several of the instrument panels.

While phthalic anhydride was developed for use by the infant dye industry during the war, resins and esters are now a far more important outlet than are dyes and intermediates; resins alone accounting for the major portion, with esters, dyes and intermediates, and miscellaneous uses following in order of their importance.

The phthalic-glycerin resins were first made about 20 years ago. As phthalic anhydride became progressively cheaper, these resins became the subject of intensive research. They were modified with various



A group of phthalic anhydride converters in the Bridgeville, Pa., plant of American Cyanamid & Chemical Corporation.

drying and non-drying oils and with varying proportions of other constituents, resulting in an almost unlimited number of variations, ranging from viscous liquids to friable solids. These many different types of resins may be conveniently classified according to their composition into four principal groups, which with their uses are as follows:

Group 1. Alkyd resins in which the modifying agent is principally saturated fatty acid. The resins in this group have largely replaced damar and ester gums and have practically revolutionized the lacquer industry. These alkyd resins are superior to many other types in adhesion, toughness of film and resistance to oils and alcohol. Their most notable characteristic is that when combined with nitrocellulose and plasticizers they produce lacquers of exceptional durability on exposure to weather. This permits formulation of pigmented lacquers of greatly improved gloss and color retention, and also of clear lacquers that are unusually durable.

Probably the chief use for resins of this group is in pigmented auto body lacquers, both in solid colors and in iridescent finishes. They are also used in clear outdoor lacquers, as on signs and similar applications, and are also important ingredients in furniture lacquers as well as in special printing inks.

Group 2. Alkyd resins modified principally with natural resin acids. These alkyd resins, in which abietic is the principal natural resin acid, are extensively used both in varnishes and lacquers for indoor use. They lack the toughness and extreme outdoor durability of the alkyd resins of Group 1. When used in nitrocellulose lacquers, these resins impart unique gloss, hardness, sanding and rubbing qualities, making them especially suitable in clear and pigmented furniture lacquers and in lacquer sanding sealers. Cooked into varnishes, especia'ly the short oil types, this group of resins imparts high gloss, pale color, and resistance to discoloration on baking or aging.

Group 3. Alkyd resins in which the modifying agent is chiefly unsaturated fatty acid. This group of resins differs from the above chiefly in their characteristic of drying to hard solid films after exposure in thin layers. They may therefore be used alone, without cooking with oil, or without combining with nitrocellulose. They have within themselves the qualities of gloss and hardness usually associated with resins, together with the elasticity and toughness ordinarily secured by combining resins and drying oils. The alkyd resins in this oxidizing group cover a wide range of hardness, flexibility and other characteristics, and have exceptional durability on exposure to the weather. They do not discolor as readily as many other types, and are therefore used to advantage as vehicles for white and pastel tint enamels.

The resins in this group are widely used as the vehicles for air drying enamels for trucks, signs, lawn furniture, filling station equipment and other applications requiring a combination of quick drying and outdoor durability. Similar enamels are baked onto auto bodies, bicycles, toys and refrigerators.

Group 4. Combinations of alkyd resins with resins of other types such as phenol-formaldehyde resins. The alkyd resins in any of the above groups may be modified by combination with resins of other types. Generally speaking, the result is a compromise between the qualities of the different resins in about the proportion in which they are combined. Commercially, the most important resins in this group are combinations of

phenol resins with the oxidizing type of alkyd resins in Group 3.

The resins of this group find extensive use in colored air drying baking enamels, and are of special interest in undercoats, such as the primer-surfacers baked onto auto bodies.

Some of the trade-marked names for these resins are Rezyl, Teglac, Glyptal, Beckasol, Esterol, Duraplex and Syntex.

Future Potential Uses for Alkyd Resins

Probably the largest potential use for the alkyd resins is in outdoor house paints, and their use in this field may develop rapidly in the not distant future.

Dibutyl phthalate has been the most widely used ester of phthalic anhydride. Its chief value is as a plasticizer in nitrocellulose lacquers and films, although it has interesting possibilities as a greaseless lubricant, and in solvent recovery. Diethyl phthalate is used as a fixative in perfumes, but chiefly as a denaturant of alcohol. Dimethyl and diethyl phthalates are also used as plasticizers in cellulose acetate films. Diamyl phthalate has recently become of interest as a plasticizer.

Concurrently with the increasing uses for phthalic anhydride in dyes, resins and esters has gone the development of new processes for important products such as benzoic acid, phenolphthalein, anthraquinone and substituted anthraquinones, and benzoyl benzoic acid. The last is finding a market in the form of its ethyl and methyl esters, as solid plasticizers which are characterized by compatibility with both nitrocellulose and cellulose acetate and by the high degree of water resistance which they impart to the film.

In conclusion, it seems reasonable to predict that there will be an increasing demand for alkyd resins, and that new uses will be found for the many other derivatives of phthalic anhydride, resulting in broader markets for this important organic chemical.

Wax Stains, Finishes and Polishes

Waxes are used in a number of specialties not frequently manufactured in paint or varnish factories. A brief discussion of some of these products, their formulation and application, will prove of considerable interest.

Wax Finishes

Wax finishes are usually made from a solution of shellac into which some wax is incorporated. The shellac cut in alcohol is mixed with a solution of wax in turpentine or turpentine substitute. A thick emulsion results which has good application and drying properties and yields a finish with good gloss. The gloss of this finish depends largely on the ratio of shellac to wax decreasing with increasing wax content. The gloss may also be modified by rubbing or brushing the film.

The shellac solution may be replaced by a synthetic resin which can be dissolved in a suitable solvent. The choice of the wax depends to a large degree on the effect desired. Among the more common waxes are bees wax, carnauba, montan, ozokerite, paraffin, shellac, and a large number of synthetic waxes. A typical formula follows:

Orange Shellac	14 parts
Alcohol	60 parts
Carnauba Wax	2 parts
Paraffine, MP. 50/52 Deg. C	1 part
Turpentine	23 parts

The shellac is dissolved in the alcohol either in the cold or with the aid of heat. The waxes are melted and thinned with the turpentine. The shellac solution is warmed to about 122° F. and the warm (140° F.) wax solution is slowly stirred into the alcohol solution. Mixture is allowed to cool under constant stirring. The mixture may be colored with suitable dyestuffs.

Wax stains are either solutions of wax in turpentine or emulsions of wax in water. The emulsions are stabilized with the aid of alkalies, such as ammonia or potash. They are colored with water soluble dyes. The proper selection of waxes insures the desired gloss, harder waxes giving a higher gloss than so-called soft waxes. Such a stain may have the following composition:

Carnauba Wax	4 parts
Ozokerite, refined	2 parts
Paraffine, MP. 50/52 Deg. F	2 parts
Sudan Yellow	2 parts
Thinner	90 parts

When preparing a turpentine stain, the waxes are melted and thinned. The dye is best dissolved in the waxes before adding the ozokerite. The thinner should be warmed before adding it to the molten waxes. The mixture is allowed to cool while stirring constantly to avoid a separation of the components.

A water emulsion stain may have the following composition:

Montan Wax, double bleached	7 parts
Potassium soap	3 parts
Potash	0.8 parts
Water soluble dye	2 parts
Water	87.2 parts

The potash, the soap and the dye are dissolved in the boiling water. The boiling solution is then slowly poured into the wax melt adding it in small portions at a time. Care must be taken that a drop in temperature does not cause a separation. It is essential that the mixture is stirred constantly while cooling.

Wax polishes differ only slightly from the wax finishes previously described. Usually they are thinner and do not contain any coloring matter. On the basis of the information given under the wax finishes and stains it should not be difficult to formulate suitable wax polishes. *Paint, Oil & Chemical Review*, Apr. 2, p22.

Action Alkali Fluorides on Skin

Harmfulness of alkali fluorides to the skin varies directly with the fluorine content of the salts, while the acid salts are in all cases more dangerous than the natural salts. Usual commercial materials are listed in order of decreasing corrosiveness as follows: Ammonium bifluoride, sodium bifluoride, potassium bifluoride, ammonium fluoride, sodium fluoride, and potassium fluoride. Even a 4% aqueous solution of alkali fluoride can, it is stated, produce harmful effects upon hands or arms, the skin of which is deficient in natural oil or on which unhealed injuries of any type are present. On normal, healthy skins, limiting concentration of alkali fluorides, above which it is inadvisable to work without protection, is 5 to 6%. Attack is very often first noticed around the finger nails. Rubber gloves or even rubber finger stalls have been found adequate protection, while a paste which has been found both protective and curative consists of magnesia rubbed together with glycerine. A washing paste made from lanolin or lanolin glycerine is recommended as useful when applied by the operative both before and after starting work. *Chemiker-Zeitung*, Apr. 1.

Potato Starch

A "Chemurgic" Possibility

By C. A. Brautlecht, Ph. D.

Professor of Chemistry, University of Maine

POTATO starch production was started about a century ago in the United States. Then "starch" meant potato starch. In time, corn starch began to be produced, not in many small plants, but in relatively large units with modern equipment and good control. This closed up most potato starch plants in the country until what is left of the industry is in Aroostook County, Maine. Here too, it may eventually disappear unless the industry is modernized. Only nature, which has favored Aroostook as a potato country, has allowed its starch industry to continue when other units in Minnesota, Wisconsin and Michigan ceased to exist. It is of interest here to note that during the past decade, there has been a marked increase in potato starch production in Canada.[1]

Because of stricter requirements for grading potatoes and to meet competition from Idaho and elsewhere, a larger supply of culls will be more certainly available. In addition, potato scab, air cracking, and other troubles produce culls. The potato competes also with other high starch foods and is subject to weather hazards, leading often to conditions yielding surplus potatoes in Aroostook. Although most of the starch plants in Aroostook are quite old, new ones, built during the past few years, include the New England Starch Company plant at Fort Fairfield, and the Maine Potato Product Company plant at Caribou, the latter built in 1934-35.

Efficient starch factories making high quality starch should be able to operate at least one hundred days per year. In the 1934-1935 potato starch year, some plants operated about 300 days, and it was essentially a busy year for most of the starch factories. Over 25,000,000 pounds of starch were produced, valued F.O.B. Aroostook, at about $750,000. A large part of the potatoes normally used by the starch factories are culls; the bulk, however, in 1934-1935, was surplus.

For certain purposes, at the present price of about four cents per pound in New York, domestic potato starch cannot compete with corn or cassava starch, but there is a market for potato starch which might reasonably be extended. About two-thirds of the weight of corn kernels as harvested and wheat grains is starch, while that of the potato as dug is about one-sixth. On the basis of starch yield per acre, however, an acre of potatoes in Aroostook produces more starch than an acre of corn in Illinois.

Economically, potatoes are the principal agricultural crop in Maine. The price fluctuates widely from year to year and is often below the production cost. According to census reports, Aroostook potato prices, for a number of years, averaged about forty or fifty cents per bushel. If there is no outside market, the grower must either sell his surplus potatoes and culls to the starch factory or dump them. The 1934 potato production in Maine was 55,486,000 bushels, compared with 44,078,000 bushels for the five-year Maine average for 1928-1932. Of this total, 36,106,000 bushels were shipped, 2,898,000 bushels were used for seed in Maine, 3,450,000 bushels were estimated as used for consumption as human food within the State, 5,319,000 bushels (al-

Potato harvesting. Photograph courtesy College of Agriculture, University of Maine

most ten per cent.) were sold to starch factories, 500,000 bushels of sound potatoes were fed to animals, 3,329,000 bushels were lost in shrinkage, and 3,884,000 bushels were dumped.[2]

These figures indicate that the potatoes dumped were worth about $400,000 and represented about three-fourths of the quantity which was converted into starch. The average price paid by starch factories for the potato starch year Sept. 1, 1934, to August 31, 1935, was approximately 30 cents per barrel of 3 bushels, or 10 cents per bushel. When potato prices are low and the farmer needs money, his only quick cash market for potatoes is often the starch factory. With increased market necessity for grading, and with U. S. Government standards of considerable complexity, there will be an increased production of culls, as well as some surplus potatoes, so that starch production will probably continue in Aroostook, regardless of price pooling, co-operative selling, and other controls. The speculative element in growing potatoes also is such as can probably never be eliminated or be much reduced. One can never predict the season weather conditions in the large potato growing and shipping sections such as Maine, New York, Michigan, Wisconsin, Minnesota and Idaho; and the potato grower must accept this hazard.

As food for man and domestic animals starch ranks high, furnishing heat and energy. It is a complex and low cost compound and will probably never be made synthetically; whereas alcohol can be made more economically from waste petroleum distillation gases, natural gas, black strap molasses, sawdust, limestone and coal, the last two of which are first converted to yield acetylene. Hence there is little incentive to consider making alcohol from crops grown for the purpose or from surplus crops. In the United States, an alcohol distillation unit, to be economical, must be large and must operate for a large part of the year.

Ethyl alcohol has been made many years from potatoes or potato starch in Germany, not from the economic viewpoint, but as part of a food-growing program, and as a partial domestic fuel substitute for imported gasoline. Published figures indicate that a decreasing proportion of the alcohol production is derived from potatoes, it being about two-thirds of the total for the year ending September 30, 1935.

Starch content of Maine potatoes (Green Mountain variety) is about 15.7 per cent. of which about two-thirds is recovered in dried form. In Germany and Holland, with potatoes bought by starch factories on the basis of starch content, 20 per cent. or more is present in potatoes bred for high starch, and almost all is extracted.

In 1909, United States potato starch production was about 25,000,000 lbs., while imports were about 12,500,000 lbs.; in 1931, domestic production was about 16,000,000 lbs., while imports were about 18,000,000 lbs., largely from Germany and The Netherlands. German annual production is quite constant at about 220,000,000 lbs. Other European countries and Japan are large producers of potato starch. United States imports averaged about 12,000,000 pounds for the five-year period preceding the World War, and they have averaged about 16,000,000 pounds annually during the past ten-year period. The old tariff on potato starch was 2.5 cents per pound. This was reduced in December, 1935, to 1.75 cents per pound, which would probably not have much influence on domestic production, especially if both production efficiency and quality are improved.

In Europe, in recent years, the price paid for potatoes for starch making was from one to two cents per pound of starch content. In Aroostook, it averages about the same. The finished European starch sells for about 5½ cents per pound in New York, while the domestic starch sells at about 4 cents per pound. The quantity of potatoes converted into starch in Aroostook has varied widely, depending largely on surplus crops.

A Potato Starch Factory in Aroostook County.

The price for a good grade of domestic starch, F.O.B., New York, has not varied much.

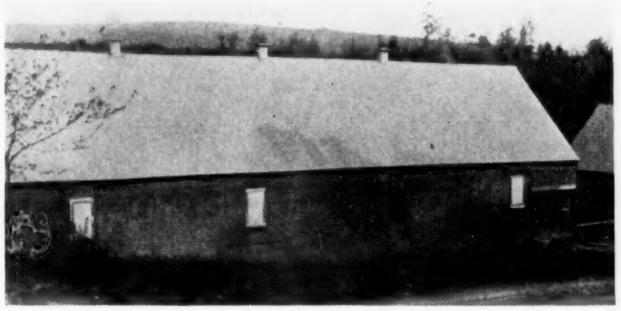
Because of economic conditions, the American potato starch industry has become an Aroostook monopoly,[3] but it is not a monopoly leading to unreasonably high prices. Potato starch, in quantity, is highly competitive with such starches as corn and cassava. The imported potato starch also competes in the American market, despite the duty, because of its superior quality, so that for some purposes, consumers are willing to pay about 25 or 30 per cent. more for the imported product.

Starch production in Aroostook is carried on in about 22 plants of from 2 to 10 tons capacity per day, operating (according to supply and price) for from two to eleven months per year. The smaller plants can probably not now be regularly operated profitably. In Europe, a starch plant is operated more intensively.

A five-ton plant in Aroostook can now be regarded as the smallest economic unit over a ten-year period. Potatoes can now be hauled by truck considerable distances to strategically located five-ton or, preferably, larger plants. Fundamental plant location factors include good highways, access to railroads, good water, and nearness to a good supply of cull and surplus potatoes. This limits the industry to a lenticular-shaped section in Aroostook from Houlton in the south, to Fort Kent at the northern boundary of the State, and from Limestone in the east to Ashland in the west.

The Aroostook potato starch plant is one of relatively low efficiency in comparison with plants in Europe and elsewhere, where production costs are also less per ton. Low cost of corn and cassava starch is largely due to efficient extraction with modern equipment. In Aroostook, relatively little machinery is used, largely of the type developed abroad during the early history of the industry. Aroostook plants can meet some competition largely on account of potato supply and location near streams which supply water and remove waste.

Each Aroostook plant has one rasp, or wooden drum about two feet in diameter and three or four feet long, covered with a perforated sheet steel plate. The potatoes, delivered in barrels of three bushels or 165 pounds each, are dumped from trucks (usually holding twenty-eight barrels) into bins. From the bins, the potatoes fall by gravity through a small gate, usually controlled by a young man, to a washer. There are no storage bins, the supply bins holding one to two truck loads. The washer is a tank of U-shape about one and one-half feet wide and about six feet long, equipped with an agitator, the blades of which force the potatoes through the trough in a slow stream of water toward the rasp. Stones which may be present are separated in, or at the end of, the trough. The washed potatoes



Potato Starch Storehouse.

then pass to a section of the washer, or to a short bucket elevator, where the wash water is eliminated, and then to the rasp. Here water is added to the potatoes, held between the rasping surface and the wall of the rasping box. The rasp tears the skins and cells, liberating the fine starch particles, the pulp and starch falling from the drum onto a shaking brass wire screen, of about 60-mesh. This screen is about the width of the drum and about six feet long. Water is sprayed onto this screen at several places to facilitate the passage of the fine starch granules through the screen. Two screens are always available so that one can be dried, and cleaned by brushing with a wire brush, while the other is in use. The starch water suspension (starch milk) then flows, or is pumped, to collection vats, made of wood or concrete. The new vats are now mostly made of concrete. The pulp passes off the top of the screen and is washed with water, through a trough, to the river. The pulp leaving the end of the screen contains about 8 per cent. of solid material, over one-half of which is unextracted starch, and includes fiber, nitrogen, and mineral salts.

In Europe, and elsewhere, a different, modern type of rasp for plant tubers is used. This has removable saw blades, set in a rotor which revolves at high speed. The saw teeth open the starch cells more thoroughly than does the perforated steel plate. The quantity and quality of potato starch produced in a modern European plant is carefully controlled, and, with modern equipment, makes possible lower production costs and a superior product.

In Aroostook, the potato grower is usually paid a fixed price per barrel of potatoes, regardless always of starch content, and usually of quality. The potatoes may have been frozen, or may have sprouted, or may be soft or rotting, all of which factors affect the quality and yield of starch greatly. Addition of chemicals abroad, such as sulfur dioxide, in very limited quantity, improves quality and increases yield. Likewise, the time interval and temperature changes, between rasping and milling the finished starch, have much influence on its quality.

Potato houses at Caribou, Me., the world's largest potato shipping center. Photograph courtesy Maine Agricultural Experiment Station.

Abroad, if any appreciable quantity of starch is not removed at the first rasp and screens, the pulp is usually passed through a second rasp or grinder. Thus the starch yield is increased per ton of potatoes. The pulp, in Europe, is usually de-watered and sold as wet cattle and hog feed locally, or de-watered, dried, bagged and shipped from the plant to be used in more distant places, as a cattle and hog feed, where it is mixed with other feeds to yield a balanced ration. Because stream pollution is forbidden in foreign countries, the waste pulp cannot be washed into streams and must be economically utilized. Likewise, in Europe, the liquor from the starch settling vats or starch separators is utilized for irrigation and as a fertilizer solution. The entire equipment of the European potato starch, and other kinds of starch factories elsewhere, is very different from that of the Aroostook plants.

The starch suspended in the settling vats separates during the night. The clear solution is then drained off, leaving the "green" starch, which contains about 50 per cent. water. Immediately above this "green" starch is a thin layer of a colloidal, slimy, protein mass. This is scraped and washed from the starch, which is compacted so that it readily sustains the weight of a heavy man. It is then washed with about three or four times

its volume of water, using powerful agitators, and the starch again allowed to settle for several hours. A second or third washing, with agitation, produces a purer and whiter product, but involves some loss of starch.

After draining the wash water, the "green" starch is shoveled into buckets or barrels and elevated by power hoists to the top of the dry-house, where it is carried in carts to the upper drying racks. In the older plants, the dry-house was separated because of fire risks due to use of stoves for drying. Steam, meanwhile, has entirely replaced the stoves. After the top dry racks are filled, the dry-house is closed, and steam is forced through steam pipes located near the racks. During the night the starch is completely dried, and by "raking" over the partly dried starch, the lumps are broken into smaller masses which fall through the top rack into lower racks and finally into the bins. In some cases, drags and other devices are used so that the racks need not be exposed to streams of cold air, which carry dust and dirt and which also cause heat waste. The heat waste in an Aroostook starch dry-house, with a cold climate and a large exposed surface area of good heat-conducting material, is, obviously, very great. European procedure uses belt driers and vacuum driers. These yield a higher quality starch and are economical in heat utilization.

In an Aroostook plant, night work consists of raking the starch and keeping up steam pressure. European plants are continuous in operation during the potato harvesting and shipping season, there being sufficient potato storage capacity to make night grinding possible.

In Aroostook starch plants, the starch known as "pearl" starch, with a granular appearance, is packed into 200-pound bags for shipment, or it is fed to grinders. From the grinders, it passes to rotating sieves with silk bolting cloths through which the fine powder passes. This is bagged in 200-pound bags and sold as powdered starch.

Potato starch is used in sizing cotton warp threads so that they will satisfactorily shuttle through modern high speed looms. Quality is an important factor for this purpose, especially in the sizing of fine count threads. High viscosity is one of the important characteristics of starch solutions needed for this purpose. Only the imported potato starch has been found generally suitable for this purpose. Woolen threads must also be sized before weaving into fine worsteds. Starches, especially potato and corn starch, are used in finishing cotton goods. Normally, starch is not widely used in the United States as a foodstuff, but some potato starch is mixed with wheat flour in making some kinds of breads. It is also used in malt sugars, beer, confectionery, sausages, soups, puddings, sauces, and pastries.

Potato starch is extensively used in making dextrin, a bonding material used in the making of plywood. Plywood plants at Houlton and Greenville in Maine use Aroostook starch for making dextrin. Some dextrin is used also in the "solid" paper box business, in the "folding" box business, and in making envelope and stamp gums. Modified starches are being studied by the large starch producers and by the Potato Starch Institute in Germany, and these studies will probably lead to new uses. Potato starch is also used in making soluble starch, in laundries, in textile printing, as a paper size, for miscellaneous adhesives and gums, and nitro-starch explosives.

In Germany, the poorest grade is converted into glucose, the "green' starch being used directly without drying. Potato glucose uses are similar to those of corn glucose. In Maine, the inferior grades of potato starch are sold at reduced prices to make gums.

The Bangor & Aroostook R.R. Co. moves about 10,000 tons of potato starch annually, largely to the Boston and New York markets. As potato starch can be stored for long periods, years of high production involve storage on the part of some plants.

This potato starch industry is of importance in Maine, but little known or appreciated in general. When examined from several viewpoints, it can be concluded that: (a) the United States is so situated from the agricultural, industrial, and scientific viewpoint, a "chemurgic" viewpoint, that it can economically sustain a potato starch industry, and that (b) the Maine potato starch industry can and should be further developed.

REFERENCES:

[1] Canadian Census. Annual Bulletins. Manufactures. Part II.

[2] Communication from Division of Markets, State Dept. of Agriculture, Augusta, Maine.

[3] Correspondence with officials and others in the large potato growing States (1935).

Fertilizer Particle Size

Segregation of fertilizer mixtures is caused largely by differences in the sizes of the grains of the different components. Segregation occurs to a slight extent in most commercial mixtures during shipment and application to the soil. In most cases this is so slight as to be of little consequence, but in 1 of the 10 mixtures tested the composition changed seriously during distribution. Regrinding a segregating mixed fertilizer a little finer considerably reduces segregation.

Nitrogen, potash, and total soluble salts were found to be removed from the placement area in the soil in greater proportion as the size of the particles diminished. Nitrogen disappeared relatively much more rapidly than other soluble salts. Decrease in the size of fertilizer particles containing phosphates was followed by greater reversion of P_2O_5 to insoluble forms in the loam soils and by disappearance of larger quantities of total P_2O_5 from the immediate zone of application in the coarse sand soil.

Large fertilizer particles in side placements under the conditions of this work slightly hastened emergence of plants and powdered fertilizers delayed it. When mixed with the soil below the seed all sizes usually found in commercial fertilizers delayed germination.

Finer than 80-mesh superphosphate grains applied in a band were decidedly superior to very coarse ones in increasing yields of cotton, but large grains of readily soluble nitrogenous materials were better in this respect than small particles of the same substance. Most efficient particle size under the average circumstances encountered in this study with grained fertilizers was 80- to 150-mesh. Dept. of Agriculture Bull. (T. B. No. 485).

British Researches for a

New Alcohol Motor Fuel Blend

Discussed by C. H. S. Tupholme

AT the Billingham coal hydrogenation plant according to published figures, for one ton of gasoline produced, 1.6 tons of coal (ash-free dry basis) must be hydrogenated, and a further 1.55 tons are required for steam and gas production, a total of 3.15 tons or, allowing for ash and moisture, 3.65 actual tons. This is equivalent to 82 gallons of gasoline from one ton of coal used. According to published estimates, the cost of production, including capital charges, is 7½d. per gallon, which is double the C. I. F. cost of imported gasoline. Plainly, the process must necessarily remain for a very long time uneconomic.

However, a new line is being actively pursued by an important coal mining group in Britain with the object of producing methyl alcohol from coal. Research and experimentation have been carried on four years and a plant, details of which cannot yet be published, is being erected to operate on commercial lines.

British Alcohol Production

Last year, 47,185,108 gallons of ethyl and methyl alcohol were produced in Britain. The raw materials consisted chiefly of malt, unmalted grain, rice, and molasses. It is claimed that by the process now being operated methyl alcohol can be produced from coal at a fraction of present costs. Laboratory tests indicate that the recoverable methyl alcohol from one ton of coal is 246 gallons. Reactions require heat to convert the water and carbon into a gas, and for every ton of coal processed an additional three-quarters of a ton is used for producing the necessary heat, so that the actual liquid alcohol produced from every ton of coal used is 140 gallons.

Methanol used by itself as motor fuel requires higher compression in an engine to obtain those super-results which make it attractive for racing. The thermal efficiency of methyl alcohol with high compression ratios is greater than gasoline, but with standard compression gives fewer miles to the gallon. Best results in ordinary motor use are obtained when methyl alcohol is mixed with benzene in a 40:60 ratio, or with gasoline in a 20:80 ratio.

The research referred to seeks to retain the advantages of methyl alcohol without having to resort to mixing with benzol or other spirits. In other words, the highest accomplishment would be a spirit commanding popular use by a self-contained system.

Methanol is an active solvent of heavy hydrocarbon gases; for instance, one volume of alcohol will dissolve from 12 to 15 volumes of butylene at ordinary pressures. Ethylene, and also the saturated gases propane, butane and ethane, are soluble in alcohol. A solution of these heavy gases in alcohol constitutes an excellent motor fuel which permits starting an engine with ease even in cold weather, besides giving elasticity and excellent acceleration in running. These gases held in alcohol show but little tendency to escape. The solution has a much lower flash point and initial boiling point than is possessed by alcohol alone, and a greater thermal value. The product also has larger fractions volatile at low temperatures.

Preheating to Release Volatiles

If, before processing the raw coal for methyl alcohol production, this coal, as well as the coal used for heating, is submitted to preheating whereby 80 per cent. of the volatiles are released (with the minimum of methane and ethane and the maximum of the heavy hydrocarbons) this yields a supply of hydrocarbons for solution in the alcohol, affording the particular requirements of a self-contained motor spirit.

To attain this requires a further sacrifice in the total liquid product per ton of coal used. In this case the process starts with two tons of coal, representing the total requirements for preheating, processing and burning to supply the requisite heat. The two tons yield 8,000 cubic feet of gas and 450 lbs. of crude oil, 30 per cent. of which consists of the lower boiling point fractions, viz., 135 lbs., and the 8,000 cu. ft. of gas contain 5 per cent. of the heavy hydrocarbons = 400 cu. ft., weighing 57 lbs. or a total of 192 lbs. = 27 gallons capable of being absorbed. After the two tons of coal have thus been preheated, having released their oil and volatile gas content, the weight will be reduced to 1 ton 8 cwt. = 3,136 lbs., of which 1,792 lbs. are processed for methyl alcohol and 1,344 lbs. are used for heating. The 1,792 lbs. will now contain 75 per cent. carbon = 1,344 lbs. carbon.

It is known that 1,568 lbs. carbon are theoretically capable of yielding 347 gallons of methyl alcohol. Therefore 1,344 lbs. would theoretically yield 297 gallons, and on the same ratio of 347 theoretical to 246 actual, the yield in commercial practice would be 210 gallons. To the 210 gallons of methyl alcohol requires to be added the 27 gallons of hydrocarbons obtained from the previous treatment = 237 gallons from 2 tons raw coal, being a recovery per ton of coal used of 118½ gallons of alcohol hydrocarbon mixture as motor fuel.

In the new process referred to all coal used is finely pulverized. The gas from the original coal and water mixture is a continuous process, the conversion is ef-

fected in a fraction of a second, and the gas has a regular composition approximating in volume: 28.6 per cent. of carbon monoxide; 14.2 per cent. of carbon dioxide; and 57.2 per cent. of hydrogen.

The carbon dioxide is frozen out in course of processing, and the carbon monoxide and hydrogen, which by volume are in the proportion of 1:2, are submitted to pressure and a catalyst, and require ten cycles, between each one of which the residual gas is automatically cleansed of its impurities. During each cycle a portion is condensed to liquid alcohol.

The capital cost of the plant is said to be £2. 10s. 0d. per ton/year of coal processed, so that a plant processing 10 tons of coal per hour, equal to 84,000 tons per year, would cost £210,000, and would produce 24,855,000 gallons of motor spirit. The estimated cost of production is 2.35 pence per gallon, based on a yield of 118½ gallons per ton of coal.

Industry's Bookshelf

Electrolytic Oxidation and Reduction by S. Glasstone and A. Hickling, 420 pp., Van Nostrand, $9.50.

Revival of interest in electrolytic processes during the last decade prompts this review of inorganic and organic oxidation and reduction. Processes are intimately described; the underlying principles are made clear. A valuable book for both research chemist and technician.

Getting Acquainted with Minerals by George Letchworth English, 324 pp., Mineralogical Publishing Co., $2.50.

No intricate knowledge of geometry, physics or chemistry is required to appreciate this delightfully simple text, yet one could scarcely find a more complete introductory study of crystallography.

Notes on Organic Chemistry by F. Francis, 525 pp., Longmans, Green, $4.

A text for advanced students. Principles and reactions discussed include "steric hindrance," oxidation of hydrocarbons in closed rings, a study of synthetic methods for both aliphatic and aromatic compounds, and chapters on the reactions and properties of each class of compounds.

Basic Economics by J. G. Evans, 198 pp., The University of North Carolina Press, $2.

Subtitled "Basic economics in a democratic society using a machine technology," this book reverts to the assumption that the economic system is at its best when the individual is given the greatest freedom.

Organic Chemistry by Howard J. Lucas, 686 pp., American Book Co., $3.60.

Down to the last equation, Lucas has written against the background of fundamental chemical laws and principles. A complete, authoritative text, suitable for undergraduate use.

The Cathode-Ray Tube at Work by John F. Rider, 326 pp., John F. Rider, $2.50.

Only those who appreciate the real importance of the cathode-ray tube as a testing device will understand the great need filled by this book. Proper use of the text depends upon the understanding of how the tube is used in the oscillograph.

Glances at Industrial Research by Edward R. Weidlein and William A. Hamor, 245 pp., Reinhold Publishing Corp.

While accomplishing what the title implies, these two leaders of research focus attention on the productive value of the Mellon Institute Industrial Fellowship System. Those who remember "Science in Action" by the same authors will recommend this book sight unseen.

Power Plant Chemistry by Augustus H. Gill (4th Ed.), 228 pp., McGraw-Hill, $2.50.

Previously titled "Engine Room Chemistry," the text acquaints engineer and engineman with the behavior of the substances with which they work. This new edition enlarges the chapter on fuels, discusses effect of smoke on equipment, and brings up to date the chapters on corrosion and lubrication.

A Brief Course in Qualitative Chemical Analysis by Louis J. Curtman, 249 pp., Macmillan, $2.25.

Theory and application are closely knit in this comprehensive text, designed for use in a one-semester qualitative course. Equations and calculations are given special attention so that the student may better visualize reactions carried out in the laboratory.

Antoine Lavoisier by Douglas McKie, 303 pp., J. B. Lippincott, $2.50.

A charming biography of "The Father of Modern Chemistry," who died because France had no need of savants. Modern industries such as bleaching, sugar refining, ore reduction, and steel still owe Lavoisier many debts.

Money by Edwin Walter Kemmerer, 406 pp., Macmillan, $3.50.

Kemmerer's "case history" of money, developed from thirty years of college lectures on money and banking, explains fundamental principles and illustrates their application with classic chapters of world monetary history.

Sulfuric Acid Manufacture by Andrew M. Fairlie, 669 pp., A. C. S. Monograph Series, Reinhold Publishing Corp., $9.75.

Though described as neither "exhaustive nor elementary," Fairlie's text certainly presents an imposing array of facts, theories and tricks of the trade. American advances in contact process work are stressed, but recent European refinements are also briefly described.

The Chemistry of Milk by W. L. Davies, 522 pp., Van Nostrand, $8.

No better source book, the sections dealing with milk sugar, milk and metals, dried milk products, and milk condensing are of particular value to the chemists.

The Chemistry of Natural Products Related to Phenanthrene by L. F. Fieser, 358 pp., Reinhold, $6.50.

Rapid isolation, within the past six years, of naturally occurring phenanthrene compounds prompts this highly technical text. Much material relates to purely modern achievements of technique, and the importance of the research summarized here cannot be minimized.

The Romance of Chemistry by William Foster (2nd Ed.), 497 pp., Appleton-Century, $3.

A chemistry book for the layman, which does not sacrifice scientific integrity for the lure of the spectacular. Foster's experiences as teacher are reflected in his clear, readable style. Many additions to this new edition have their source in today's newspaper headlines and such conceptions as "heavy water," "vitamins," and "rayon" become to the layman understandable facts.

Cryolite

as a Chemical Raw Material

By Arthur E. Gibbs

Technical Director, Pennsylvania Salt Manufacturing Co.

A mass of cryolite with quartz and siderite impurities disseminated through the mass.

CRYOLITE is a word of Greek origin meaning "icestone," for a lump of the mineral in water is similar in appearance to a piece of ice. The only known commercial deposit of cryolite in the world is situated at Ivigtut on the southwest coast of Greenland, on the south side of Arsuk Fjord, thirteen miles from the seacoast.

The mineral was discovered first by the Esquimos at the foot of the granite mountains which rise almost perpendicularly to the height of a thousand feet directly from the water's edge. At the base of this coast range the mineral exists in solid masses, penetrating on one side the rocky ridge at an angle of 45°, and on the other side descending into the ocean. The shores of the coast are so precipitous that vessels fastened to the land by the bow, have scarcely soundings at the stern.

Giesecke in 1806 was the first to visit Ivigtut. His numerous samples of the minerals he found were sent in 1808 on a boat bound for Copenhagen which, after successive captures by a French privateer and an English frigate, was taken to Leith, Scotland. The minerals were sold to Thomas Allen & Collmrie, Edinburgh mineralogists, for forty pounds.

In the eighteenth century Danish missionaries resident in Greenland sent to Copenhagen as curiosities some Eskimo fish net sinkers of cryolite. Another early use was to mix pulverized cryolite with tobacco for use as snuff.

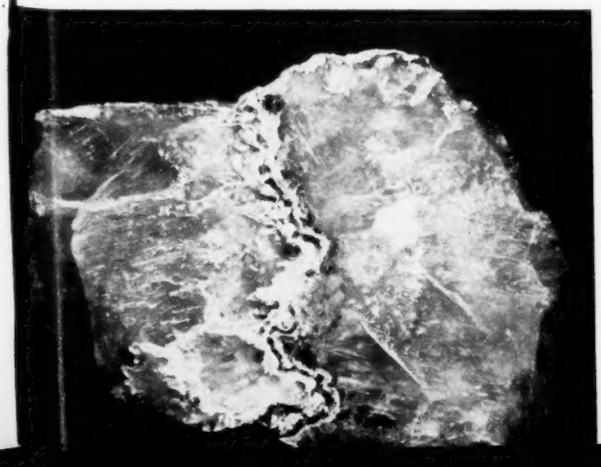
The mine at Ivigtut is owned by the Danish State and the mining concession belongs to the A/S Kryolith Mine og Handels Selskabet, Copenhagen. This firm divides all of the raw material between The Pennsylvania Salt Manufacturing Company of Philadelphia, which has the North American rights; and the Oresunds Chemiske Fabriker, Kommanditselskake, ved C. F. Jarl, Copenhagen, which controls the manufacture and sale in the rest of the world.

In 1837 Simon Tissier suggested that the cryolite could be converted into soda and alumina. This suggestion was adopted in 1849 by Julius Thomson who developed the method in a commercial way, and for many years this was the chief use of the ore.

The Danish government took control of the deposit about 1860, and since that time the royalties from the deposit form the chief source of income and are used for the general support of the colony, any additional amount required to maintain the colony being contributed by the government of Denmark. Two years previous to the Danish government taking control, through the initiative of Professor Julius Thomson, a firm was established which erected and operated a plant in Copenhagen; and between 1861 and 1865 soda plants were built at Hamburg, Maunheim, Prague, Goldschwieden, and Warsaw. In 1865 the Danish company made a contract with The Pennsylvania Salt Manufacturing Company for two-thirds of all the cryolite produced, and a plant was erected by the Salt Company at Natrona, near Pittsburgh, for the refinement of the cryolite. From the mineral, alumina and soda are manufactured—the alumina being converted into the Natrona Porous Alum and Lump Alum.

The Greenland deposit lies on the shore and under a fjord, the open pit being separated from the water by a bank some fifty feet wide. The cryolite mine itself consists of slopes operating from the bottom of an open quarry, about 500 feet long running northeast to southwest. The north end is 60 feet wide and the pit widens to 160 feet at the other end with a depth of 150 feet. At the northwest side of the pit, an arm of cryolite extends out toward the fjord, and this is reported as the portion of the deposit now being worked.

Ivigtut and the surrounding plateau is underlain with granitic and hornblendic gneisses, probably of the Precambrian era. The gneisses are cut by numerous dikes of diabase. The cryolite associated with much pegmatitic material lies entirely within a small intrusive mass of porphoritic granite, a pink formation of quartz,



The greenish yellow mineral Ivigtite, an aluminum sodium silicate which occurs as stringers in the cryolite mass.

orthoclase phenocrysts, and biotite, which appears to be of the mother rock of the fluoride deposit.

Along the northwest wall of the quarry some green altered granite is enclosed in the cryolite. This mass consists mostly of quartz and sericite (a hydrous iron aluminum silicate containing some fluorine). At the bottom of the pit are ledges of green sericitized granite. Associated minerals led to the assumption that this cryolite deposit was an intrusive igneous mass rather than one formed by strictly water deposition, as in the case of several small deposits in Russia and in the western part of the United States.

Method of Processing Ore

At the mine in Greenland, a large part of the associated non-fluoride minerals are culled out. The impurities found in the cryolite ore as delivered to The Pennsylvania Salt Manufacturing Company's purification plant at Natrona fall into three classes: fractions which separate out of the molten magma; products of partial interaction between the native rock and the fluoride; and products of substitution within the mass brought about by circulating waters.

Following the usual sequence of precipitation from molten magmas, the first fractions to solidify were the siderite, pyrites, galena, and blackjack which occur beautifully crystallized in masses and as isolated crystals within the cryolite. Next to separate was the silica in long six-sided crystals generally complicated by twinning and frequently suspended in the cryolite mass so as to be clearly visible, particularly if the piece was first wetted with water. The silica is also commonly found in well crystallized aggregates enclosing galena and pyrite. The size of these crystals varies from several inches in length down to a microscopic fog dispersed through the matrix. The larger crystals are generally opaque and porcelain-like, but in some of them bands of clear quartz will occur. Due to the great difference in hardness between quartz and cryolite, the larger crystals will generally break clean of the fluoride. Quartz in microcrystalline form is also found intercrystallized with topaz (a silicon-aluminum fluoride), fluorspar, and pyrites in porcelain-like masses of great hardness ranging in color from pure white to black. This aggregate also occurs as thin veinlets running through the cryolite, and possibly represents the final stage of intrusion.

Calcium is present in the cryolite mass in several forms, fluorspar predominating. This mineral occurs intercrystallized with cryolite in green and blue masses and veinlets frequently in close association with the microcrystalline topaz. Also calcium occurs as the fluoride in the mineral arksutite which is a calcium sodium aluminum fluoride and which may be merely a solid solution of fluorspar in cryolite, as analysis shows the calcium to be present in the cryolite in degrees from nothing up to 7% found in arksutite. In appearance arksutite closely resembles cryolite, though its cleavage faces show a pearly luster. The mineral crystals are generally badly distorted, and occur frequently in slippage planes showing a micaceous structure. Another calcium bearing mineral found generally associated with the mother rock is ivigtite, a hydrous calcium aluminum silicate belonging to the mica group. Associated with it are fluorspar, topaz, and silica.

Quite obviously hydrothermal alteration products of cryolite are thomsenolite, pachnolite, and hagemannite—the two former being white to yellow incrustations on cryolite, while the latter is a brown clay-like mineral occurring in veins with the other two. All three contain more or less calcium, magnesium, and iron replacing the bases of cryolite.

There are about fifty other minerals which have been identified as occurring with the cryolite and which have to be removed in the process of purification before it can be used in the arts.

Properties of Natural Cryolite

The specific weight is 2.96.

The hardness lies between 2.5 and 3., *viz.* between gypsum and calcareous spar.

Cryolite is almost insoluble in water requiring 2800 parts of water to dissolve one part of cryolite.

Cryolite fuses at 950° C. or 1742° F. There is practically no loss in firing, the loss on heating to 900° C. is less than half of one per cent. The coefficient of expansion of cryolite is 7.4, and the chemical formula, $3\ NaFAlF_3$. It is thus a double salt of fluoride of sodium and fluoride of aluminum in the proportion of 60 to 40. Chemically pure cryolite, therefore, contains 32.9% sodium, 12.8% aluminum, and 54.3% fluorine.

Purification

Due to the variety of impurities in the ore, several methods of purification have been developed. First the crude ore is screened to get rid of the very fine material in which the iron has oxidized and permanently discolored the cryolite. Then handpicking removes the fluorspar, topaz, and as much of the siderite as is free. The next stage is crushing all through ¼" mesh, after which the mineral is passed on continuous rubber belts under high power magnets which remove the magnetic impurities including siderite and part of the pyrite. Following the magnets the ore is separated into two sizes (the coarser of which passes over two types of jigs) to remove galena and pyrite in the first; and silica, hagemannite, thompsenolite, and other minerals in the second. The finer sizes pass over Wilfley tables and then over jigs for removal of silica, etc. After drying and further magnetic treatment, the two sizes are remixed and ground with porcelain balls in a porcelain-lined mill. An air separator system insures a fineness in the finished product of at least 99% through 150 mesh, and 90% through 300 mesh.

Three grades of natural cryolite are refined and sold by The Pennsylvania Salt Manufacturing Company—Standard Kryolith, Kryoflux, and Kryocide. Kryolith is packed in 500 lb. barrels and 100 lb. bags. It con-

tains a minimum of 98% sodium aluminum fluoride and a maximum of silicon and iron oxides of 1.5% and .25% respectively. Lime present as fluorspar seldom tests over .1%. Kryoflux is sold in similar packages, its chief use being as a metallurgical flux. Its cryolite content lies between 93% and 94%. Iron (Fe) is limited to .75%. The remainder of the impurities consist largely of other fluorides such as hagemannite and fluorspar though some silica is also present. Kryocide is packed in 100 lb. and 50 lb. paper bags and in 6 lb. bags packed eight to the case. This product is essentially the same as Kryoflux excepting for the fineness. It is especially ground, having a fineness of 5 microns or less which is about 1/5000 of an inch, the nearest sieve being 2500 mesh (*i.e.*, a square inch of the sieve would have 6,250,000 holes). The purer grade of Kryolith may also be ground to this fineness.

The manufacture of soda and alumina products from cryolite was continued from 1865 to about 1900 when it was abandoned, a cheaper raw material, salt, having been substituted for the manufacture of soda products and bauxite for the alumina products. Cryolite found its biggest use in the ceramic industry under the following heads: in enamels, in glass, in glazes, and as a flux in aluminum, galvanizing, etc.

Cryolite in Enamels

The use in this work has a double value, by its fluxing or solvent action it decreases the viscosity of the batch and increases the rate of interaction of the other ingredients in the smelting furnace, and it also acts as a secondary opacifying agent. The limiting term "secondary" is used since American enamelers do not employ it to obtain all the opacity in an enamel, the presence of some tin oxide being preferable. In equal quantities by weight cryolite is twice as strong a flux as lead oxide. In conjunction with fluorspar, soda, lead oxide, and other fluxes it forms a liquid of very low fusion temperature which, as the furnace heat increases, dissolves increasing quantities of the more refractory ingredients such as feldspar, silica, etc. In enamels the quantity of cryolite used varies from 4% up to 16% although few enamelers incorporate more than 12% of cryolite in their batches.

Cryolite in Glass

Cryolite is used in glass much as in enamels, but its value lies more in its opacifying effect than in its fluxing action. Shades of opacification from dense opaque to opal and alabaster are obtained by varying quantities and length of heat treatment. Pastel tints are produced in colored glasses by a faint fluoride opacification. Alabaster glass is produced from the same mixture as used for opal with the addition of small amounts of chlorides or sulfates, which act to precipitate colloidal suspensions in the melt which would otherwise cause opalescence. It is claimed by English workers that cryolite and fluorspar may be substituted directly for some of the lime in a standard lime soda glass.

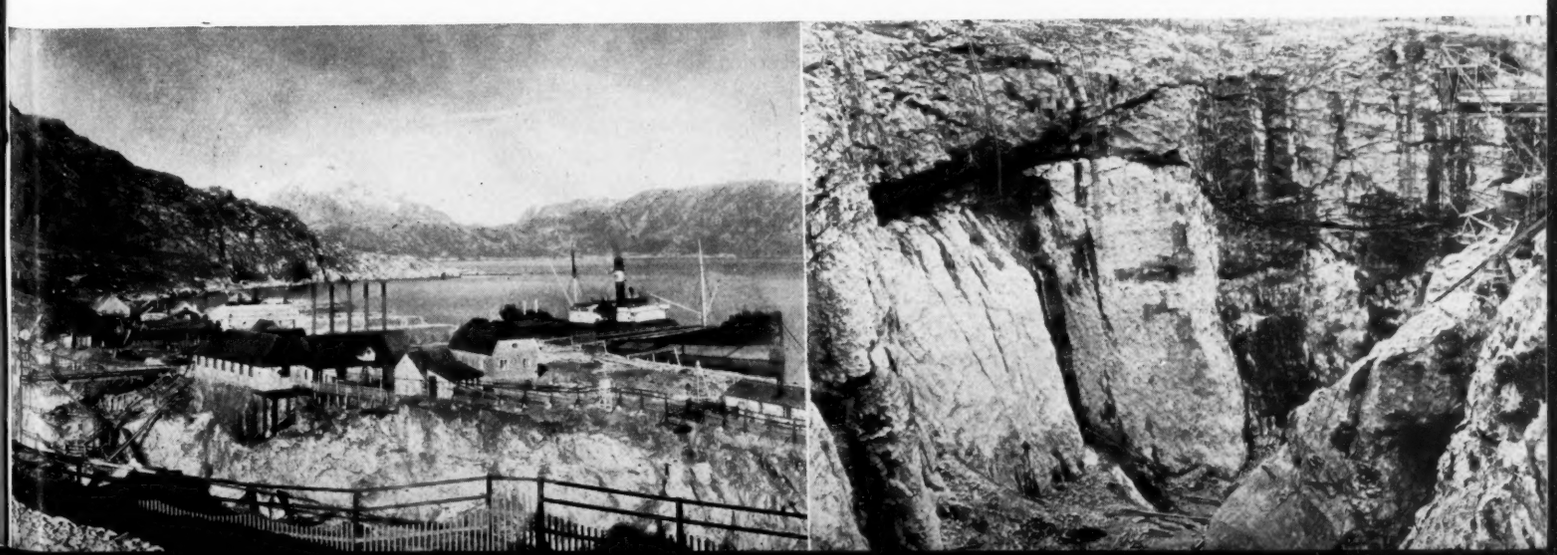
When feldspar is used as a source of alumina, opalescence is produced by 2½% of fluorine. If precipitated alumina is used a somewhat higher quantity of fluorine (4%) is necessary to produce an equal effect.

The problem of fluorine loss occurs in glass as well as in enamels. For glass work, Karmans gives the following figures to be used in calculating the fluorine loss of various fluorides: natural cryolite, 9%; artificial cryolite, 14%; fluorspar, 17%; sodium silicofluoride, 50% of total fluorine is lost. These figures are approximate as so much depends on the composition of batch, heat treatment, size of pot, etc. With the use of sodium silicofluoride, unless nearly all of the fluorine has been driven off, the approximate fluorine content of the glass at any period after smelting will be a matter of conjecture. When cryolite is used the fluorine content of the batch will remain reasonably constant during the period of pouring.

Cryolite in Glazes

Until recent years the use of fluorides in glazes was not generally advocated due to variations in the finished product resulting from poor plant control. With this difficulty removed through technical advances, appreciation of the usefulness of the more stable fluorides has grown.

Left, mining and loading cryolite at Ivigtut, Greenland. Right, interior of a cryolite mine.



As in enamels the function of the fluoride may be either that of flux, of opacifier, or of both. Requirements of the fluoride are that it be of reasonable purity and of highest possible stability. The higher temperatures and longer firing periods employed in manufacturing glazed ware preclude the use of the more readily decomposable fluorides such as sodium silicofluoride and the several brands of artificial cryolite. The natural mineral, Greenland cryolite, however, is sufficiently resistant to prolonged heating that it may be used in glazes of low maturing temperature as flux, and as secondary opacifier.

Manufacture of Glazes

Experimental work has determined that cryolite, or cryolite with fluorspar, may be used in many types of glazes including the standard leadless glaze in an amount, however, not exceeding six or seven per cent. For opacity in the glaze the amount may be increased up to 20%, though such a quantity is generally used only in the high borosilicate types due to the high decomposition rate with the higher maturing temperatures required for other glazes. The leadless glazes will blister and give a matte surface as the result of such large quantities. The fit of the glaze is rendered difficult to control by the use of too large quantities of fluorides in any type of glaze, due to their sensitivity to variations in firing temperature, atmosphere, etc.

Cryolite in a glaze is a solvent, promoting the rapid interaction of the raw ingredients. During this process a part of the fluorine of the cryolite is liberated and all glazes incorporating this mineral should be fritted, in order that loss of fluorine from the mass will not be too rapid to allow completion of its task, and to insure homogeneity and freedom from bubbles in the glaze.

During the process of fusion of the fluorine-bearing glaze, due to the volatility of boron and silicon fluorides, a small loss of boric oxide and of silica will occur. In order to avoid upsetting the required oxide ratios, allowance must be made for this loss in preparing the glaze batch. Due to the many possible variations in thermal treatment of any one glaze, the amount of these oxides to be added in excess must be determined experimentally.

The fluxing action and opacifying power of the cryolite residual after fritting the glaze are directly dependent on the extent to which decomposition and fluorine loss have progressed. For this reason fritting should be carried out rapidly, and the melt should not be kept molten after complete reaction of the component oxides has occurred.

A glaze of high alkalinity or one containing a relatively large amount of alumina will be more stable than others, as the tendency of the fluorine to volatilize is decreased. Where natural mineral cryolite is used the fluorine loss is less, as proven by experiment and practice, than if fluorspar, synthetic cryolite, or sodium silicofluoride are used.

In a glaze it has been found that slow cooling, or cooling and then reheating to about 400°C. will bring out the utmost in opacifying power of the fluorides. Overfiring due to decomposition of the fluorides will tend to destroy opacity. Because of this undue loss of fluorine the fit of the glaze may be lost due to the great influence of fluorides on the coefficient of expansion. Further, effect of overfiring is to decrease the gloss of the glaze.

In lead glazes, in which the opacity is furnished by the oxides of tin, zirconium, or antimony the fluorides may be used much as in enamels, but not so freely. Their action should be restricted to that of flux rather than that of secondary opacifier. This is particularly true in case of use of zirconium oxide when cryolite is needed in small quantities to counteract the increase in melting temperature produced by partial solution of the refractory zirconium oxide. The use of a small amount of borax with the cryolite is advised, but a large amount may completely destroy the opacity.

A small amount of cryolite added to glazes containing barium is said to reduce pin holing. Cryolite should be added after fritting the glaze due to the distinctive effect of the high fritting temperatures required.

Limitations of Fluorides as Fluxes

Fluorides as fluxes should not be used in glazes to be fired above 1200° C., and above 1000° C. they cannot be expected to contribute opacity or any great degree of opalescence. Unnecessary prolonged firing is to be avoided.

As a flux cryolite has been found useful to enhance the brightness of colors by increasing the amount of the coloring agent actually taken into solution. In translucent colored glazes larger amounts of cryolite give an opalescence if not fired at too high temperatures. Certain colors, however, such as sodium uranate are destroyed by the presence of fluorides.

A few glaze formulae are given below: white glazes to be fired around 950° C. which are reported to give good results if carefully used.

	No. 1	*No. 2*	*No. 3*
Feldspar	24.5	25.8	27.0
Quartz	17.9	18.1	19.0
Borax	33.6	32.6	22.2
Kryolith	15.1	23.2	31.8
Soda	9.0		

Opaque white glaze or enamel for sanitary ware sole coat, or first layer in decorated or glazed ware.

	Opaque Coat	*Top Glaze*
Silica	22.5	15
Alumina	3.5	1
Lime	3.5	12.6
Zinc Oxide	20–35	30
Soda Ash	16.5	18
Potash	2.5	
Antimony Oxide	12.5	
Boric Oxide	13–35	21
Fluorine	2.0	2.5

As a metallurgical flux and solvent, cryolite finds its greatest use in the aluminum industry which in its present success depends on the discovery of Hall and Heroult that cryolite dissolves sufficient aluminum oxide

when molten to allow its use as a bath for production of the metal. The present process utilizes other fluorides in conjunction with the cryolite to lower the bath temperature. This fluoride bath is contained in carbon lined tanks and is heated by passage through the melt of current from carbon electrodes suspended in the bath. Aluminum oxide is fed slowly into the melt, and through the action of the electric current and the carbon of the electrodes, the alumina is decomposed into aluminum metal and carbon dioxide. The metal sinks to the bottom of the tanks and is drawn off periodically.

In melting aluminum scrap it is general practice to use a fluoride bearing flux to dissolve the oxide and to carry in suspension particles of any other impurities. This flux must be very fluid at the pouring temperature of the metal. For this reason other fluorides such as fluorspar and salts of sodium and potassium (chloride and fluoride salts) are added to the flux to reduce the decomposition rate. Ammonium chloride-cryolite mixtures in a ratio of one of the former to two of the latter have also been found to give good results. These fluxes are used in quantities up to two pounds per hundred pounds of metal.

In conjunction with the flux, a scavenger is generally used to bring the impurities to the surface. The scavengers generally used are compounds either volatile or of relatively low boiling temperatures such as zinc or ammonium chlorides. These salts are either placed at the bottom of the pot when charging or preferably forced down to the bottom after melting. The rapid evolution of gas gives a violent stirring action, the rising bubbles entraining the particles of impurities, carrying them to the surface where they are either dissolved or held in suspension by the slag. The action is largely mechanical. The use of aluminum chloride has been advocated as one of the best scavengers.

Large aluminum scrap pieces are generally fed into already molten metal, while the smaller scrap and dross are first melted with scavenger and flux and then remelted after casting into ingots. A formula for slag used in small scrap melting is as follows: 16% calcium fluoride; 28% cryolite; 56% aluminum fluoride. This mixture has the advantage over compositions containing zinc chloride in that it does not take up water hygroscopically on standing in storage.

Miscellaneous Uses

Other uses of this mineral in ceramics include its application for use as binder for granular materials such as abrasives generally in conjunction with clay.

Recent investigation of the Bureau of Standards on the use of auxiliary fluxes in white ware manufacture included tests on cryolite for this purpose. Results indicated that the fluxing action is too great for this purpose, but the field has by no means been completely covered. It is known that cryolite in aluminum silicate masses fosters the formation of mullite crystals, and its future application along these lines offers an opportunity for interesting experiment. In the Greenland cryolite deposits, the presence of masses of silica and topaz finely intercrystallized would indicate that such a mass might be made artificially by the use of cryolite. As topaz has a higher ratio of alumina to silica than even mullite, and the topaz silica mass possesses extreme strength and a high melting temperature, such composition should be eminently suited to many industrial applications.

As An Electrical Insulator Material

Another recent application of this mineral lies in the manufacture of a new type of electrical insulating material. This process, patented by an English company, consists in fritting together cryolite with a borosilicate base, grinding the chilled frit, mixing with a large proportion of ground mica, and heating blanks to a dull red heat. These blanks are then pressed into the desired forms. The product is almost metallic in hardness, may be machined, drilled, threaded, etc. An advantage of this material is that it may be cast with metal inserts with which it gives a perfect seal. Carborundum or other granular material may be substituted for some of the mica.

As a binder for fluorspar, cryolite has proven satisfactory as disclosed in a recent patent. This "all fluoride" product is said to resemble porcelain in appearance, and to withstand thermal shock satisfactorily.

A mixture of cryolite with anhydrous aluminum chloride finds an application as mineralizer or flux, in production of crystallized spinel. Either one without the other is unsatisfactory, but the two together allow crystallization of the magnesium oxide aluminum oxide mass considerably below their fusion temperature.

Cryolite as an Insecticide

Over forty years ago the employees in The Pennsylvania Salt Manufacturing Company's plant at Natrona discovered that the fine powder from the dust collector proved to be effective in destroying the potato bug, and the material has been regularly used for that purpose since that time. In more recent years it has proved to be an effective stomach poison for chewing insects but its use was restricted because of the difficulty in grinding the material sufficiently fine. This difficulty has been overcome and material of five microns or less in fineness is regularly produced.

A number of Government Experiment Stations have given splendid assistance in connection with this problem and among the earliest workers are S. Marcovitch and W. W. Stanley of the University of Tennessee Agricultural Experiment Station. In February 1930 Messrs. Marcovitch and Stanley wrote as follows in *Industrial & Engineering Chemistry*: "The demand for an arsenical substitute has arisen from various sources, such as the truck and apple growers who are harassed with the residue problem. More recently muck soils and cranberry bogs, where arsenicals have been in use, have been found to become unproductive owing to the decomposition of the insoluble arsenates. The results of the experimental work to find a stomach poison that will take the place of arsenic and yet be safe on foliage, toxic to insects, and comparatively non-

poisonous to human beings indicate that cryolite and barium fluosilicate offer the most promise at the present time. These materials have a lower solubility than sodium fluosilicate and are therefore safer on foliage."

In connection with insecticidal work, one of the most important properties of the mineral or natural cryolite is its insolubility in water, one part of cryolite requiring 2,800 parts of water for its solution. Since the pioneer work of Messrs. Marcovitch and Stanley a great advance has been made in the art. Cryolite gives successful control against the Mexican bean beetle, tobacco flea beetle and the cucumber beetle, the codling moth, and a host of other insects which destroy our vegetables and fruit.

Disposal of Wastes

Members of the Division of Water, Sewage and Sanitation Chemistry of the A.C.S. discussed on Apr. 15th at Kansas City the problems attending the disposal of oil well brines and plating room wastes.

Paul Haney, Kansas State Board of Health, reported that probably the most promising method of disposal of salt waters thus far tried is the method of underground disposal The salt water, instead of being stored in ponds or allowed to run into fresh water resources, is returned to the underground formation from which it was produced or to some other suitable underground formation.

Several difficulties were encountered when this method was first attempted. Among the most important was the sealing or plugging of the sand formation into which the salt water was being introduced. This plugging may be caused by suspended matter such as iron oxide carried by the brine or it may be the result of chemical reactions which cause the precipitation of insoluble chemical compounds in the pores of the sand.

At present, the Bureau of Mines, in cooperation with the Kansas State Board of Health and an oil company, is carrying on work on the problem of treating brines before their return to sub-surface formation so that they will not cause plugging of the sand around the salt water disposal well. An experimental filter plant has been built at Oil Hill and experiments on the filtration of the brines through sand are being carried out. One important finding thus far is that sands obtainable in Kansas, if properly graded, are suitable for brine filters.

Water solutions from certain metallurgical extraction, plating, and cleaning operations, employing soluble cyanides, are among the most lethal liquid industrial wastes discharged, according to Prof. C. R. Hoover and F. K. Burr of Wesleyan University and the State Water Commission of Connecticut. Although the characteristic odor of hydrocyanic acid (prussic acid), usually formed from such solutions, gives warning to those familiar with the odor, fatal results are frequently reported with higher animals and numerous examples of wholesale destruction of fish life have been observed. Chief dependence of the manufacturer for the disposal has been dilution in natural water courses or air dissemination of hydrocyanic acid after natural or artificial acidification. Greater density of population and larger volumes of stronger solutions of waste have made it increasingly dangerous to rely upon these simple methods.

The investigators re-examined a number of the methods suggested for the disposal of this waste. Action of oxidizing agents in acid and alkaline solutions appeared to be too expensive, and, in some cases, to produce products almost as toxic as cyanide. Recovery processes, designed to reabsorb hydrocyanic acid evolved by the acidification of the original waste, appear to be promising for ore extraction wastes but to involve too much original outlay for use with relatively small quantities of cyanides discharged by the plating industry.

In spite of the fact that previous investigators reported difficulties with the relatively simple acidification and aeration treatment operations, it has been found that with proper chemical control this method is readily applicable where sufficient unoccupied land is available.

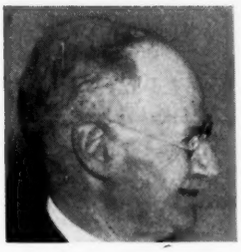
General conclusion drawn is that the most effective results to be secured by this type of method are secured by definite acidification with sulfuric and exposures in shallow, baffled ponds or basins to natural aeration for periods varying with the depth.

For more congested areas, where natural dissipation of prussic acid may be objectionably dangerous, a simple precipitation method has been developed and results in the production of a Prussian blue of some possible by-product value. The precipitation of cyanides from plating solutions has been found, by numerous investigators, to be incomplete, but this appears to be due to the fact that the copper cyanide complexes are not decomposed under the ordinary conditions employed for the formation of Prussian blue. By removing the copper from the acidified plating solution with scrap iron, it has been found possible to bring about quantitative precipitation of the cyanides present in the form of the insoluble Prussian blue. Difficulties with the coagulation of the precipitated material have been overcome by re-circulation of the precipitate from previous operations.

Mercury Vapor Boilers

Mercury approximating 750,000 lbs. or 10,000 flasks is at present circulating in three boilers and turbines driving generators in the eastern U. S. Two smaller boilers are being installed. Those now in operation are at Schenectady, N. Y.; Hartford, Conn.; and Kearney, N. J. The first and third mentioned are each of 20,000 k.w. capacity; that at Hartford is half this capacity. The boiler at Schenectady is an outside installation. It contains 300,000 lbs. of foreign-produced mercury (4,000 flasks), equivalent to about half the production of California in '34, and more than that either of Oregon or of Texas and Arizona combined. The boiler is fired with powdered coal, and the pressure maintained is only 140 lbs. per sq. in.—scarcely one-tenth that of steam at the same temperature. The boiling point of mercury is 675° F., and the boiler temperature is 975° F. A cubic foot of mercury weighs 845 lbs., about 13½ times that of water. A little sodium is added to the mercury to aid heat transfer between the mercury and steel, and some zirconium (or titanium) is added to retard the solution of iron from the boiler by the mercury. A sampling and testing apparatus at the stacks checks mercury loss and is sensitive to minute quantities of mercury. The loss from the boiler and power plant is one per cent. or 3,000 lbs. a year (40 flasks). The mercury vapor flows to the turbo-generators and then to the "condenser-boilers." Here, water is used for condensing the vapor, but the latent heat of the mercury is sufficient to generate steam at 400 lbs. pressure, which is piped to a nearby plant. The available energy in the steam so produced exceeds the power obtained from the mercury generators. The mercury circulates in the system seven times an hour. Mercury vapor from the blow-off and safety valve of the mercury boiler is led to the condenser-boilers. The General Electric Co. states that there is no other known method of generating power from fuel so efficient as that represented by the mercury and steam cycle. The Schenectady installation cost around $4,000,000 or $200 per kilowatt capacity; the cost of mercury at present prices would be about 7½ per cent. of the total. Pioneering difficulties appear now to have been fairly well overcome, and within the next year or two the Emmet boiler may be marketed more aggressively, possibly in relatively small units, even down to 1,000 k.w.

Jury of Paper Experts Renders Verdict on Chemical Service



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Manager, Merritton Division, Alliance Paper Mills; TAPPI executive committee.

F. C. CLARK

Vice-president, Skinner & Sherman; chairman, TAPPI Permanence and Durability Committee and Operating Division.

G. K. SPENCE

Chief engineering and chemical consultant, Castanea Paper Co.; TAPPI past president.

***TWELVE** of the best known technologists of the paper industry sat around a dinner table at the Chemists' Club in New York recently as the guests of* **CHEMICAL INDUSTRIES** *and discussed frankly and informally their problems in the terms of the chemicals they use and the service that the chemical industry renders its customers in the paper field. Following is a verbatim report of this critical yet friendly symposium.*

In opening the discussion, Williams Haynes, publisher of CHEMICAL INDUSTRIES, said: At this end of the table we started a discussion about the service which chemical companies render the paper industry. I am just throwing the ball out for you fellows to kick around. What is there to be said for or against the technical service being rendered by the chemical industry? Mr. Heritage, you have been on both the buying and the selling sides of the fence. What do you think about it?

Mr. Heritage: We are expected to do considerable exploratory work on products when it would seem we might legitimately expect to be told what those products are good for and what we might get for our money. We should be able to make a fairly intelligent survey at the desk, not having to go into the laboratory, except perhaps for a little checking. We are interested in the new things that come along—certainly we cannot afford to be otherwise—but, on the other hand, we have developments of our own, more than enough to keep the staff fully occupied for a long time.

Mr. Krimmel: Isn't that because the chemical industry, in this case, is not able to do that work itself? They would do it if they had the equipment. They cannot evaluate for our needs in their laboratories very well.

Mr. Heritage: I think any of us would hesitate to go into the plant of a customer and say, "Well now,

ALLEN ABRAMS

Technical director, Marathon Paper Mills Co.; past president, TAPPI; inventor of "Penescope."

JOHN TRAQUAIR

Director of Research, Mead Corp.; chairman, TAPPI Raw Materials Division.

W. R. MAULL

Vice-president, Dill & Collins, Inc.; newly-elected TAPPI vice-president.

H. R. MURDOCK

Director, Research, Champion Paper & Fibre Co.; TAPPI executive committee and chairman, Alkaline Pulping Committee.

JOHN SCHUBER

Consultant to paper industries; chairman, proposed TAPPI New York State Section.

C. E. CURRAN

In charge of pulp and paper section, Forest Products Laboratories; chairman, TAPPI Research Division.

C. C. HERITAGE

Technical director, Oxford Paper Co. and Oxford-Miami Paper Co.; TAPPI president, '35.

we have something here we think might be of advantage to you, and we would like very much to have you test it, and let us know how you come out." We would not get very far, I am afraid.

Should Know Properties

Mr. Abrams: Isn't the difficulty very often that the man who brings you a product doesn't know enough about its properties to tell you intelligently what it may be expected to do?

Mr. Heritage: It seems to me he should make it his business to know that.

Mr. Abrams: I don't think that he can tell you the ultimate answer in your particular industry, but he can at least tell you the properties of his product.

Mr. Krimmel: I think Mr. Heritage is a little bit tough on the chemical industries. We ought to have enough experience to know who won't help themselves, and we ought not to be very sympathetic with them. On the other hand, there are things, like starch, for instance, which can be evaluated in the laboratory as to certain properties; but how can a starch manufacturer or starch converter tell whether that starch will be all right for all paper mills, absolutely and definitely, unless he uses it in making paper? They can't very well afford to have an experimental paper machine just for this purpose.

Mr. Murdock: On the other hand, we know of laboratories that have equipment able to test actual paper making operations.

Mr. Heritage: Let me ask you this: a man comes into your office and offers you a sample of starch. Does he say, "This is a Number 1 starch, with such-and-such characteristics; this is what it will do for you, and this price is so-and-so," or, "This is a Number 2 starch and the characteristics are such-and-such, and this is what I will deliver to you?"

Mr. Krimmel: Yes, he does. He says, "This is a certain grade of starch. It has certain properties. It is good for certain things." He will tell you that it is a surface sizing starch or that it is a beater starch.

Mr. Traquair: Having had twenty years of experience with starches, I am going to "sit" on you fellows. Starch is starch. As far as purity is concerned, you can grade it. But when you buy starch, you should insist on knowing its origin. You should know whether it is a tapioca starch, a sago starch, a corn starch, or potato starch. According to their origin starches have different characteristics. You cannot change the characteristics of a starch easily. That is to say, you cannot easily make corn starch have exactly the same characteristics as tapioca starch. The specification for a raw starch, therefore, should be: that it shall be free from gluten, from dirt, etc., not modified by overheating during the drying, and that it should give a paste of a certain viscosity, or a jelly strength under definite testing conditions. If the starch has been modified, I would always insist on knowing whether it had an oxidizing treatment or an acid hydrolysis, or generally the type of treatment.

Mr. Clark: Will they tell you?

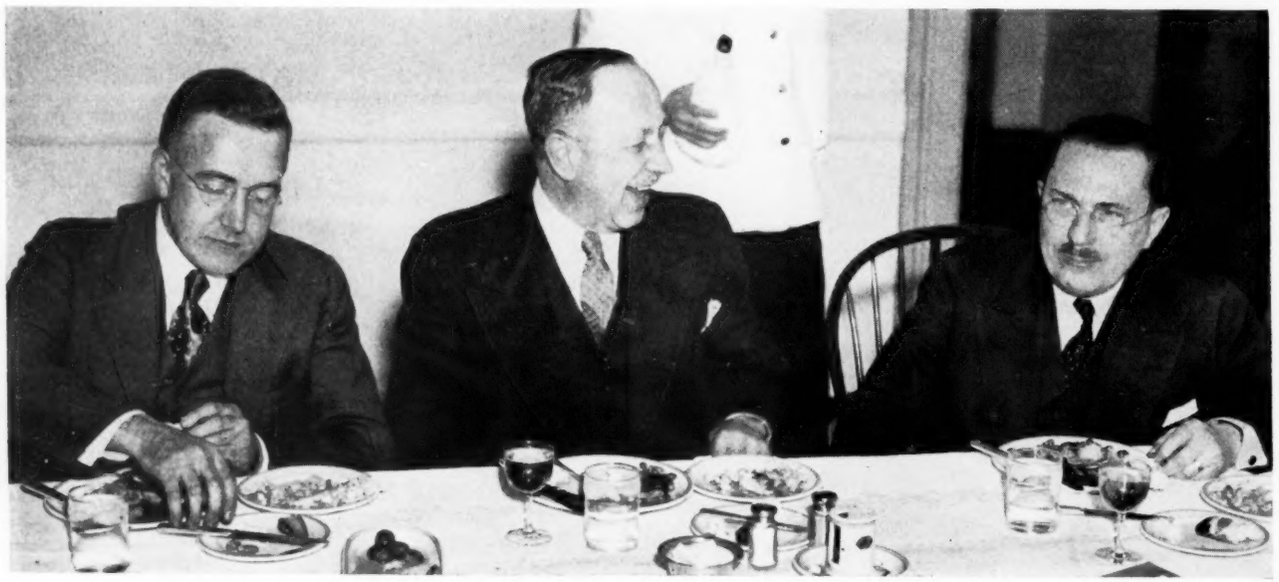
Mr. Traquair: If they won't tell us, we say, "We are not interested unless you tell us." The corn starch manufacturers of this country are selling very definite graded starches. Tapioca starch made in Java, in relatively large, well-operated factories, is a very definite article. It would be difficult, I should say, to write specifications for starch, because you cannot compare, on an even basis, corn, potato, tapioca, sago starch, etc.

Mr. Schuber: Are they different kinds of starches?

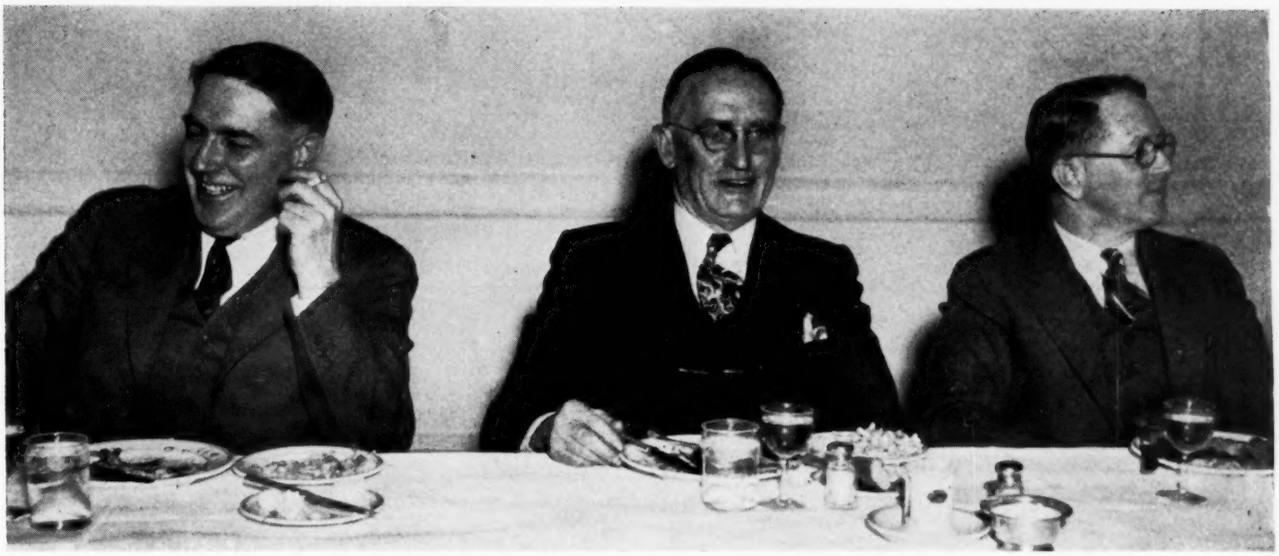
Mr. Traquair: Absolutely. You can't compare sulfite pulp and soda pulp—

Mr. Abrams: What you mean is that you can't compare a Republican and a Methodist. (Laughter).

Mr. Traquair: What I mean is this: the characteristics of a starch, as to its physical properties and to



Left to right, M. A. Krimmel, F. C. Clark, and H. R. Murdock.



Left to right, C. C. Heritage, C. E. Curran, and G. K. Spence.

the paste it yields, are quite distinctly different. We use in the paper industry really only two starches, tapioca and corn starch. They are entirely different. One is produced under the ground, in a tuber, the other is produced above ground as a grain crop. The percentage of hemi-cellulose in one is different from the percentage in the other.

Mr. Heritage: The only point that I want to make, is this: I think this sales approach is weak: "Mr. Heritage, here is a sample of our product. Won't you try it out and see whether it is good for anything?" I suggest this approach instead: "Mr. Heritage, I have a product which is of a certain purity, has certain characteristics and will, I believe, do such and such in your sheet of paper, which will help you to make better paper and more of it at lower cost."

Mr. Traquair: Mr. Heritage, the real point is that no starch salesman who knows his business will come to you and say, "I have a starch that will do so and so, better than any other starch." The method of using that starch will make all the difference. If you dump raw starch into your beater, (I don't care if it is the best starch in the world) it is next to useless except on a very thin paper. The intelligent use of starch is part of the battle. But on the other hand the man who comes in to sell you starch simply knows he is selling starch. He frequently knows little about the properties of starch or the use of starch in paper, or the characteristics required for the particular job—whether a beater starch is required, or a starch for tub sizing, a thin boiling starch, or a starch for surface sizing.

Mr. Haynes: What is to happen to the man who does not know starches as you do?

Mr. Traquair: Well, he just picks out some salesman who gives him the best cigar and buys the starch. (Laughter).

Mr. Spence: I fear this is developing into a starch symposium. Mr. Heritage is talking about chemicals in general, and I take a little exception to his remarks. No two book manufacturers use exactly the same formulae for their sheet and they wouldn't want to deviate from what they are actually making at that time. We have a small machine on which we make experimental runs. We wouldn't think of putting any material into a commercial run until we tried it out experimentally.

Mr. Haynes: Do chemical salesmen give you sufficiently definite information about what they have, regardless of what you want?

Mr. Spence: If they told us what they had, we wouldn't know if it was what we wanted until we tried it out, and the sheet of paper made proved satisfactory to our customer.

Mr. Fair: I am of the opinion that the salesman who does not commit himself as to what will happen in your mill is nearer to being right than the man who comes in and makes sweeping claims. The salesmen today are, generally speaking, insufficiently trained in their particular line to be able to give you an intelligent summary of what has happened in other mills. The same condition exists to a large extent in our own industry: too few of our own men selling paper know their products and their applications.

Mr. Sutermeister: All this depends a great deal on the chemical that is being discussed. Standard chemicals are well understood, but take a lot of these wetting out agents, or some of the newer syntheic resins, we know but little about them. The man who is trying to introduce them doesn't know what they are and he doesn't know what they will do. He presents them to us as having certain properties and suggests that possibly they have some use in the paper game. I think it is impossible for the chemical salesman to know enough about our requirements to judge whether his chemicals will save us money or not. To go back to the much-discussed starch, probably any one of a half dozen different book paper mills will be using starches in

different ways. One mill isn't going to tell the starch salesman exactly what they are doing so he can peddle it around to another mill. I think that the average salesman gives us what information he can, and when he gets through, he gets up and walks out. He doesn't waste our time very much. He is just about as helpful as he can be, until he becomes sort of a walking encyclopedia which, personally, I don't expect him to become.

Mr. Maull: I have been thinking back to a period when we didn't have control or technical protection and all the mills were about on the same basis. Probably all here recall when they started in the paper industry, finding a great deal of mill practice had to be chucked out on the waste heap due to misinformation started by the claims of some salesman. I imagine that a lot of things were put over on a mill without a technical department. Today, larger chemical industries are really going into pilot plants and doing practical work to demonstrate the value of their products. But there is another phase of this which I resent to a certain extent: advertising to our users their findings in order to sell their product. Those who wanted to electrify railroads advertised the smoke nuisance and created public opinion against the steam railroad, but they didn't make friends with the railroads or sell equipment.

Service to Competitors

Mr. Haynes: I have heard complaints that the amount of scientific or engineering service which chemical companies have to render consuming industries is a considerable burden and it sometimes reaches the stage of verging closely, if not trespassing, on unfair competition.

Mr. Curran: Perhaps I can answer it this way: the best chlorine salesman I know doesn't sell chlorine. He sells service. He is selling to the paper industry something he knows all about. The trouble with many salesmen is that they say, "Here is a starch. What can you do with it?" They ought to have some idea as to what you can do with it.

Mr. Abrams: I think you have to differentiate between standardized products and those which are relatively new. For example, chlorine is such a stable commodity that its properties and uses are well known. On the other hand when a new product is presented the salesman must have a thorough understanding of its properties; he should have enough knowledge of the pulp and paper industry to visualize where the product might be used. He will then be fortunate if he can contact a mill which is willing to cooperate in carrying on the extensive, and usually expensive, experiments required to adapt the product to the industry. That is the only way to arrive at a sound conclusion. So, I think that you can take the more or less standardized chemicals and make specifications for the uses already developed; but with new chemicals there must be close cooperation between the manufacturer and consumer.

Mr. Haynes: I rather take it that the consensus of opinion is that the technical salesman is better than the entertainer.

Chorus: Absolutely!

Mr. Schuber: The trouble is the chemical industry hasn't enough technical salesmen in the field.

Mr. Haynes: What paper problems lend themselves to a chemical solution?

Mr. Heritage: A great many.

Mr. Haynes: What of your most pressing present problems do you think the chemical companies can help solve?

Mr. Spence: The one they can answer for me is how to eliminate sulfite waste liquor.

The Ideal Salesman

Mr. Traquair: I like the salesman who comes around and tells me frankly about his product, what it is, what it will do, from his experience, and says, "Can you use this?" Then again, I enjoy—I am frank to say—some men from the chemical industry who perhaps only touch the paper very lightly, but who tell me about products that they are selling to other industries and who say, "I do not know if these products are of any value in the paper industry, but we are doing such and such a thing with them." I resent the salesman who comes along and says, "I have a product that will do so and so and so and so." I say, "Well, what is it?" "Oh, well, we are not supposed to say what it is."

Mr. Haynes: Coming back to this question of what the chemical people can do for you, Mr. Heritage, have you some thoughts on that?

Mr. Heritage: I hesitate to talk about casein with Mr. Sutermeister here, but I think that is a typical chemical likely to give a paper mill trouble. It used to be limited to coating operations, but it is coming into use in other places, so that the example isn't quite as limited as it used to be. A carload of casein that is off standard will cause about as much trouble in a coating mill as anything I know of. Yet, who can say what is standard?

Mr. Haynes: Has anybody had any experience with casein from soya-beans? Mr. Sutermeister, have you?

Mr. Sutermeister: Only laboratory experience. I have made tests on a good many different samples, nothing very hopeful just at present.

Mr. Haynes: Is it comparable with the other caseins?

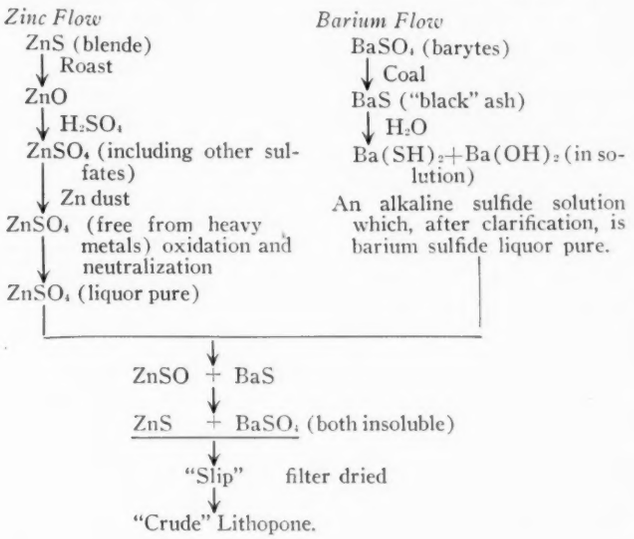
Mr. Sutermeister: It has rather different properties. I think it has not yet reached the stage of development where it is safe to compare it with casein. I have seen some good samples and some poor samples. My personal belief is that it will come eventually.

This discussion of paper industries' chemical problems will be continued in the June issue.

Characteristics of Lithopone and Zinc Sulfide Pigments for Paint Manufacture

By H. Mills, M.Sc.

LITHOPONE should be confined, strictly speaking, to the equi-molecular mixture of zinc sulfide and barium sulfate, but one quite commonly hears the term "high strength lithopone" used for mixtures containing more than about 30 per cent. zinc sulfide. The generic term, however, is possibly permissible because the steps involved in the manufacturing processes are practically identical whatever the percentage sulfide aimed at. These steps are tabulated below:



Crude lithopone has no marked pigmentary properties; to develop these it must be heated to, and maintained at, an optimum temperature for a regulated period terminated by sudden quenching in water. After wet grinding, filtering, drying, and dry grinding, the product is finally ready for use. If, in the zinc flow, the sulfuric acid is replaced by hydrochloric, the resulting "crude" is pure zinc sulfide, since barium chloride is soluble, and by a proper combination of chloride and sulfate any desired mixture of zinc sulfide and barium sulfate may be obtained. Other methods of precipitation are being developed, the most notable being that used for pure and high strength sulfide pigments.

Zinc sulfide pigments are definitely non-toxic; they are harmless both during manufacture and in use. Stringent purity is essential during manufacture to maintain their whiteness and brightness. After calcination they are neutral and for all practical purposes inert; they will then resist all organic and inorganic reagents except concentrated mineral acids. In density they vary from 4.0 for pure sulfide and 4.45 for barium sulfate. The refractive indexes vary from 2.37 to 1.64; the true lithopone averaging 1.84.

In the past, the resistance of lithopone to active rays depended closely on their freedom from traces of certain undesirable radicles, notably chlorides; now, any lithopone may be made light fast by the addition of minute amounts of various metals, the most useful of which is cobalt. This metal, present to the extent of 0.015 per cent. of the zinc content, will confer stability. The fact that such a small amount is effective conveys some indication of the purity of lithopones as commercially prepared. Such a trace is without sensible effect on any property other than light-fastness. There are, however, many grades of lithopone of satisfactory light-fastness without this treatment; the treatment is meritorious in that it has extended the utility of a range of lithopones of low oil absorption previously unsuitable for many purposes because of their poor light resisting qualities.

It is usual to convey to users an indication of pigmentary value by a comparative statement of hiding or obliterating power and of reducing power or tinting strength. The following table gives figures for the commercially common white pigments but since there is no absolute standard for reducing power it has been based, as usual, on 100 for white lead, and a similar comparison has been made in the case of hiding power.

Pigment	Quantity Used (sq. ft./lb.)	Hiding Power (W.L. = 100)	Reducing Power (W.L. = 100)
White lead	15	100	100
Pure zinc sulfide	55	367	540
60% zinc sulfide	36	240	450
Lithopone (28-30%)	24	160	280
Antimony oxide	27	180	360
Titanium dioxide	72	480	1050
Zinc oxide	22	147	200

Although in these figures H.P and R.P. do increase together, no obvious relationship exists between them. For example, lithopone and titanium dioxide have respectively about 2.8 and 10.5 times the reducing power of white lead, but the comparative hiding powers are only 1.6 and 4.8 white lead. These two terms are measures of two important and independent properties of white pigments—namely, power to obliterate or hide a given surface, and power to reduce or weaken the tint exhibited by a particular colored material. If the paintmaker is making a white paint he is concerned largely with H.P. and that is what he should measure; if he is making a colored paint he is also concerned with the proportion of white to mix with his stain to produce the necessary tint. Nevertheless, in literature obviously concerned only with white paints, it is not unusual to find R.P. cited as a measure of the pigment strength. The color maker might conceivably deem it an advantage, in some cases, to have as low R.P. as possible in his white, providing the H.P. remained of the required order, for then his final color would contain a relatively high proportion of white pigment with consequent influence on service and costs.

Sulfide Content of Lithopone

Attention has frequently been drawn to the apparent discrepancy between the sulfide content of various grades of lithopones and their pigmentary strength. The explanation has long held ground that lithopone owes its peculiar position to the co-precipitation of zinc sulfide and barium sulfate whereby the sulfide more or less effectively coats the sulfate so that the pigment has, to all intents, a surface of zinc sulfide. This has recently been supported by experiments on heat of immersion of pigments in oil, and by ultra-violet transmission micro-graphs of lithopone dispersions in a suitable media. Crystallographic examination by X-ray methods fails to support this view; the sulfate and sulfide apparently exist in separate entities, physical properties, *e.g.*, density, and more particularly refractive index, are generally the additive result of the two pure constituents.

Existing controversy on the subject of the constitution of lithopone is based on apparently enhanced pigmentary values for lithopone, which can be explained without resource to arguments based on the spatial distribution of its constituents. When the advantage of lithopone over, say, pure sulfide, is commented upon, the tacit assumption made is that in these pigments zinc sulfide alone accounts for the pigmentary value,

while the blanc fixe is merely a diluent. This, however, is hardly a fair view of the part played by barium sulfate. Mechanical mixtures fall very little short of the commercial co-precipitated products. What deficiency there is, is not due to any constitutional advantage in co-precipitation, but to the difficulty of developing the fullest pigmentary value during the manufacture of zinc sulfide.

The measurable physical properties of these pigments—density and refractive index, reducing and hiding power—are all more or less definitely measurable and the paintmaker should have no difficulty in finding, on the zinc sulfide range from lithopone to pure sulfide, a pigment to meet his requirement in these respects. If one of the three normal commercial grades does not meet his specification, he can safely use a mechanically mixed pigment without any great fall-off in relative strength. Such mechanical mixtures seem to be quite as satisfactory in use as co-precipitated pigments; this is, of course, a matter of observation—there must be very few paints made in which the pigment is not a mechanical mixture. Apart from these easily measurable properties, there are other characteristics probably much more important, but much more difficult to define. Such items as speed of wetting with oil; pigment-vehicle relationships; oil absorption, etc., are extremely important in different manufacturers' products, and even in any one manufacturer's products.

Surface Properties

Surface properties are of fundamental importance in deciding pigment-vehicle relationship, and when considering these pigments from this angle it is essential fully to appreciate the nature of the zinc sulfide-barium sulfate complex. Of the various whites, the zinc sulfide pigments are the only group initially prepared as a result of ionic precipitation. Zinc oxide and antimony oxide are sublimated; white lead may best be described as the result of a solid gaseous reaction; titanium oxide results essentially from the controlled hydrolysis of titanous salts. Lithopones—using this as a generic term—are distinctly colloidal when precipitated; they show the drying and swelling phenomena usually associated with gels, and they display strong adsorption characteristics. These characteristics, considerably modified during subsequent processing, particularly by the heat treatment, are never completely destroyed. Indeed, it is the manufacturer's job to turn them to the best advantage.

Control of Properties

Lithopones from the furnace are chemically inert and neutral (pH approximately 6), but by judicious control at all stages they may be produced with any desired pH and with oil absorption varying from 12 to 23 per cent., with a similar variation for other vehicles. Again, although lithopones do not react chemically with paint media unless they contain an undue amount of zinc oxide—which normally should not be present more than 0.2 to 0.3 per cent.—a controlled degree of chemical activity may be given to the surface by taking advantage of adsorption in the distribution of traces of extraneous materials of the desired character. Without such additions it is possible, during the manufacture, to control such properties as particle size and surface condition, so that the behavior of the same chemical product in paint manufacture may be quite appreciably varied. For example, two products of the same pH and oil absorption may show, in manufacture, quite different rates of wetting with oil or even differences in behavior in the can. An appreciable degree of tendency to display thixotropy may be imparted, so that a paint quite fluid on working may "body up" on standing and again become fluid on agitation. The vehicle used is equally important in its influence on such phenomena.

As an outside paint pigment lithopone, including the higher strength pigments, is best formulated with other pigments of *proved reliability*. The principal defect of *white* lithopone paints for outside use is chalking, associated with cracking and loss of adherence. Chalking, or disintegration of the surface film, is, to some extent, typical of all white pigments, and is due, so it has been suggested, to the transparency of these pigments to short light waves. Colored pigments are not so subject to chalking because colors, except blue, absorb short rays. Zinc oxide absorbs these rays so that the general trend is to use mixtures of lithopone and zinc oxide, 10-40 per cent. oxide, and these have met with considerable success.

Zinc sulfide pigments are compatible with other whites—titanium dioxide, white lead, and timonox. It is fair to say that with these, weathering properties of the resulting mixtures are more or less intermediate in character between the two components, but that with oxide the weathering is increased more than proportionately because of the opacity of the ZnO to short wave lengths. It is advantageous to mix with the lithopones a second white pigment which will toughen the paint film, increase the elasticity and generally counteract those physical properties of lithopone films which lead to cracking. Leaded zinc oxide is much esteemed for this purpose; if, however, it is desired to keep entirely clear of lead, non-leaded zinc oxide will be found to give excellent results.

Benefits of Pre-treatment

Recently, attention has been called to benefits resulting from pre-treatment of the vehicles used in paint mixing, the general tendency being towards the use of more highly bodied oils with a consequent toughening of the paint film. It is now general to include a proportion of stand oil in linseed oil vehicles, as the advantages of this are apparent. The amount which may be added is, of course, limited by the brushability of the paint, but for normal pigmentation up to 20 per cent. of the oil may be stand oil. The extender will also be found to exert considerable influence on the service characteristics of lithopones. The well-known 40-40-20 formula may be varied considerably on the inert. Recent work has shown the importance of particle size and shape in weathering characteristics, particularly in hindering checking and cracking.

It is evident that the formulation of paints based on the lithopone or zinc sulfide pigments offers a very wide field for experiment and research. The normal lithopones are by now pretty well known and the capabilities and limitations fairly thoroughly appreciated. When compared with the older white pigments their hiding power is considerable.

High Hiding Power Pigments

Recent developments have focused on high hiding pigments, and in this class pure zinc sulfide is well to the fore. In pure sulfide and the intermediate strength lithopones, the paintmaker has at his disposal pigments generally behaving similarly to normal lithopone with the added advantage of high strength pigmentary properties. These are valuable for use with extenders other than blanc fixe, and pure sulfide may be mixed with such extenders and show pigmentary values similar to the co-precipitated lithopone. This should give confidence to the paintmaker in trying formulation on extenders other than blanc fixe.

No considerable amount of extenders may be added to normal lithopone (28-30 per cent.) without seriously diminishing its hiding power, but with the higher sulfide contents paints may be formulated with other extenders and yet remain within the desired covering range. As the density of the available extenders covers a fairly wide range, mixtures of similar zinc content may have quite different bulking values. For example, a 50 per cent. zinc sulfide-barium sulfate has a density of approximately 4.2; the corresponding calcium mixture is approximately 3.2 with a slightly higher hiding power. From a paper read to the Manchester Section, Oil & Color Chemists Ass'n., and published in *Chemical Age*, Feb. 22, '36, p171

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Metals and Alloys

"Carbex," a super-refractory of the silicon carbide type is manufactured by McLeod & Henry Co., Troy, N. Y. Material is of the non-growing type and is suitable for sidewalls and arches for kiln fire boxes; for linings, baffles and hearth plates in small oil or gas-fired furnaces; for piers subjected to heavy loading, in high temperature furnaces and other uses. It has the high heat conductivity characteristic of silicon carbide.

Cast Iron Filler for Porcelain

E-6 Cast Iron Filler, of interest to the porcelain enamel industry, is a product of Porcelain Enamel & Mfg. Co., Balto., Md. The process used makes it one of the most formative fillers available. If used carefully it will become very hard, almost making itself part of the iron, thereby saving the user many bad castings. It not only affords saving by reducing the scrap pile, but keeps production at a steady rate, instead of being held up by bad castings.

Cheaper Stainless Steel Process

A stainless steel has been invented by F. F. Gordon, Sheffield, England, which aims at much cheaper cost in production. By the new process razor blades could be given a rustless surface, and a stainless coating could be given to sheets of corrugated iron for roofs, and applied also to all metal pipes and containers. *Industrial Britain*, March, '36, p13.

Coatings

Korolac No. 27, a solution of Koroseal, is a synthetic rubber-like material developed by B. F. Goodrich Co., Akron, Ohio. It is recommended as a covering for plating racks, applied by the user, providing a translucent, corrosion resisting, tough, inert coating with good insulating properties, satisfactory for practically all kinds of plating service.

Protective Covering Steel Wire

The "bethanizing process" of protecting steel wire with a zinc covering involves among other things extensive use of chemical processes in the production of pure zinc. Reported by L. H. Winkler, metallurgist, Bethlehem Steel Corp.

Synthetic Rubber-Containing Varnish

A varnish containing synthetic rubber has been perfected by M. Blinkor, a Russian chemist. It is said to have strong adherence to rubber surfaces, high elasticity; has alkali-, acid- and water-resistance; is odorless and tasteless, and remains unchanged at temperatures from less than 10° to over 40° C.

Synthetic Metal Coating

Sterilkote, a synthetic coating for metals, sufficiently adherent and elastic to permit bending, stamping and even drawing operations without cracking or marring of the finish, is being manufactured by Bradley & Vrooman, 2629-35 S. Dearborn st., Chicago. It may be had in a variety of attractive colors and clear, which develop into hard, glossy coats. Product, applied by spraying or roller coating, is recommended particularly for lining beverage and food containers, due to its being non-toxic, odorless, and tasteless, as well as non-porous.

Latex in Lacquers

Use of an intermediate coating of rubber or latex in admixture with certain partly polymerized organic compounds is said to overcome the difficulty in securing adhesion to rubber with quick-drying lacquers. Softening agents may also be added during process which is covered by English Patent 422,670.

Durable Black Coating for Metal

Nitrogloss, a durable black coating for metal, is said by Steelcote Mfg. Co., producer, to wear like porcelain, retain its gloss, and to dry immediately. It is especially recommended as an automobile finishing and refinishing material. *Industrial Finishing*, April 36, p46.

Heat Hardening Resin

Amberol H H-1, a heat-hardening resin of the phenol formaldehyde type, is announced by Resinous Products & Chemical Co., Phila. Product is intended for the production of highly resistant coatings and finishes, particularly on metal. It has good elasticity and adhesion and retains the impact and mar resistance of the type. It is also highly resistant to heat and to a number of solvents. It is supplied in toluol solution, and is applied by the normal methods. A fairly high baking temperature (340°) is required for its final cure, which differs from that of available finishes in being effected without oxidation. Extensive applications in the metal finishing field are expected because of its excellent adhesion to metal surfaces, both dull and polished. Other uses include coatings on radiators, exhaust pipes, and the like, where heat resistance is important.

Paints

Possibilities in the pigment field together with evidence as to the importance of "protection" as a quality in house paint were discussed at the A.C.S. meeting last month in Kansas City. Dr. Henry A. Gardner described investigations carried out with a series of metallic compounds of phthalic anhydride, and suggested that various metallic phthalates could be developed for improving rubber and its derivatives. Similarly, they might increase the light resistance of viscose films to be used in packing, for the opaquing and strengthening of various cellulosic products, and for decreasing the chalking tendencies and increasing the tint retention of paints and lacquers.

Structural Glass Compound

"Bull-dog," a structural glass compound for forming a permanent bond between glass and many other materials is announced by L. Solomon & Son, 199 Wooster st., New York. Compound is made from vegetable oils and gums and is not affected by heat, cold or moisture. It combines remarkable bonding strength with enduring elasticity. Installations using this product include all varieties of colored structural glass, as well as metal ornaments and lettering. It can be used over porous flat wall coatings, cold water paint, wood, wallboard, plaster, iron, bronze, steel, brick, stone and other materials.

Casein-Lithopone Paint

Casein-Lithopone, a flat wall finish, has been designed to fill the gap between non-washable cold water paints and more expensive flat wall paints. Product dries in two hours and gives a dull, washable coating. One coat usually suffices for previously painted walls. It may be applied successfully over fresh plaster. Du Pont, producer, announces that white and nine pastel shades are available.

Miscellaneous

Industrial uses for waste walnut shells were announced by the California Walnut Growers Ass'n, whose engineers and chemists claim the most important of fifteen uses found for ground walnut shells are in hard and soft rubber compounds, asphaltum linoleums, roofing paper, filler in dynamite and abrasive mechanics soaps.

Synthetic Pitch

The increasing demand for vegetable pitch has resulted in the development of a synthetic pitch by A. E. Starkie Co. Product is said to be far superior for most purposes than pitch obtained from the distillation of vegetable materials. It is adaptable for use in floor tile, cloth coatings, insulations, paints, etc.

INDUSTRIAL CHEMICALS

NOW AVAILABLE—THE FOLLOWING LINE OF ASSOCIATED ORGANIC CHEMICALS SERVING THE SYNTHETIC RESIN, SOLVENT PLASTICIZER AND PHARMACEUTICAL INDUSTRIES.

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MALEIC (TOXILIC) ACID — **SUCCINIC ACID**

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MALIC ACID — **FUMARIC ACID**

PHTHALIC ANHYDRIDE

DESCRIPTIVE BOOKLET ON REQUEST.

INTERMEDIATES

NATIONAL ANILINE AND CHEMICAL COMPANY, INC.

Intermediates Division — *Bowling Green 9-2240*

40 RECTOR STREET — NEW YORK, N. Y.

Branches and Distributors throughout the World

NATIONAL N QUALITY

Fluorinated Paraffin Wax as a Dielectric

Fluorinated paraffin wax is prepared by reacting chlorinated paraffin wax and antimony trifluoride in a suitable solvent, such as benzol. The antimony trifluoride is used in the chemically equivalent amount to yield the fluorine necessary to replace the chlorine in the wax. Reaction is carried out with continuous stirring in the presence of a halogenation catalyst, such as antimony pentachloride, which should be present in an amount equal to about 5 to 10% by weight of the amount of the antimony fluoride. Reaction is carried out at the boiling point of the solvent in a suitable reflux apparatus. Material should be subjected to vigorous agitation. The fluorinated paraffin wax is liquid at ordinary temperatures, and can be separated from unreacted solids by filtration, the solvent finally being removed by distillation. The residual fluorinated paraffin wax is suitably purified by a contact or percolation process using Fuller's earth or other suitable absorbent. Fluorinated paraffin wax is suggested as a dielectric material. Abstracted from *The Chemical Trade Journal.*

Leather-Latex Material

Salpa, a leather-latex material, contains a high proportion of rubber, the process utilizing new leather cuttings which are reduced into their constituent fibers. The tanning materials and effects are removed to re-tan the leather in the fibers themselves, producing a uniformly tanned leather, the fibers subsequently being combined with latex. Material can be submitted to the same processes as leather, that is graining, finishing, etc. It is also said to sew, skive, pare, etc., as well as leather. Produced by Salpa Francais, 55 Rue Amsterdam, Paris, France.

Peat Moss Fertilizer

"Huminal," a fertilizer consisting of prepared peat moss to which chemical elements have been added in such fashion that they cannot be washed away by heavy rains, is now being marketed in Germany, according to a report from the American Consul at Stuttgart. It is also manufactured in tablet form, and contains various nourishing elements essential to successful fertilization of potted plants.

Milk from Soy Beans

Malayan experiments with a soya bean compound, used as a substitute for milk, are likely to be extremely valuable, reports Trade Commissioner Julian B. Foster, Singapore. Formula, as given by the College of Medicine in Singapore, may be obtained upon application to the foodstuff division, Bureau of Foreign and Domestic Commerce, Washington.

Cellulose Sponge

A cellulose sponge that can be used for all purposes to which sponges are usually put and in virtually every respect, and that will give superior service, is announced by du Pont Cellophane Co. It is tough and durable, but becomes extremely soft and pliable when wet, precluding any possibility of scratching the most highly polished surface, and will outlive the natural product. Product is made of highly purified wood and cotton cellulose pulps, its sponge-like construction being the result of reactions. See photograph on Chemical Specialties insert.

Vermiculite as Sound Insulation Material

Vermiculite—a Montana mine product with unusual capacities for expansion—as a thermo and sound insulation material is foreseen by Oliver C. Ralston, chief of the division of nonmetallic minerals of the U. S. Bureau of Mines. The product fills the same uses as cork but retains its metallic properties.

Gas from Corn Stalks

Gas from corn stalks made by fermentation, is, according to Prof. Ellis I. Fulmer who described process at a meeting of the A.C.S., principally methane, with small amounts of hydrogen. Light and heat could be suitably obtained by this process, he claims.

Chlorinated Lubricants

Laboratory tests indicate that the ester methyldichlorostearate is a satisfactory substance for use in an oil alloy. A fleet of light trucks of identical make and condition was purchased for a practical road test. Half the trucks were lubricated with standard high-grade mineral oil and half with same oil blended with 0.75% of the ester. After 12,500 miles of eight-hour-a-day, six-day-a-week operation, the engines were dissembled and their running parts examined for loss of weight. The parts of cars lubricated by plain mineral oil wore at a rate which was not considered abnormal, but which was greater in each case than the wear of parts lubricated by the blend. From a paper by Dr. Gordon D. Byrkit read to the Petroleum Division, A.C.S., Kansas City.

Month's New Dyes

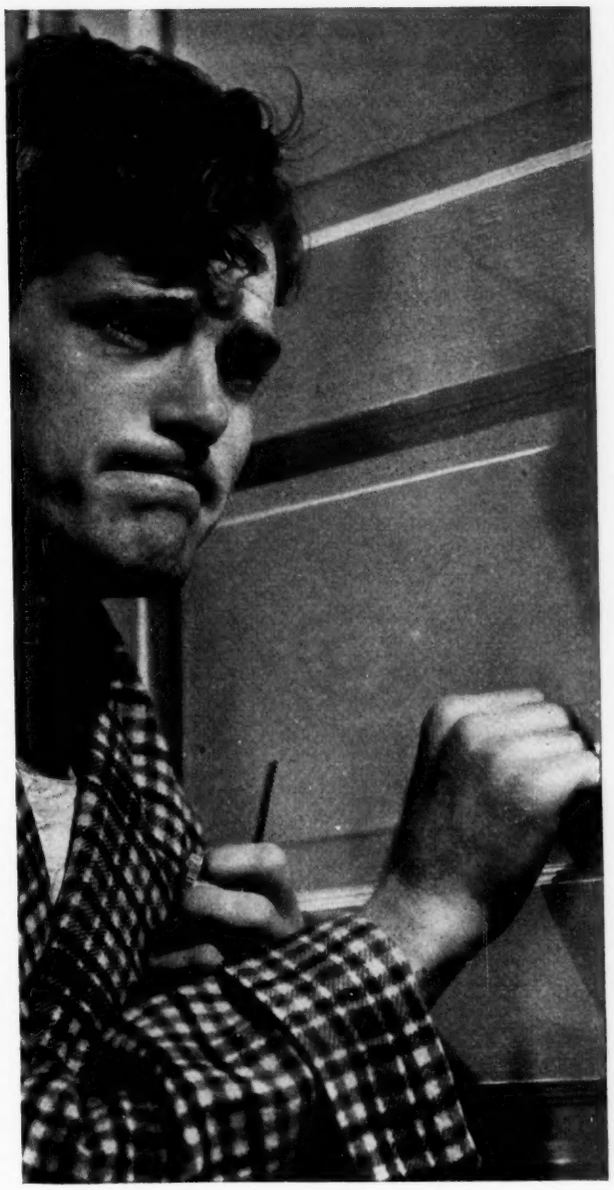
Additions to the colors in du Pont's Dyestuffs Division include: Diagen Orange MG (Patented) to the line of stabilized azoic colors for use in printing cotton. It produces bright, yellow shades of orange of good fastness to washing at 160° F. and to power laundering with chlorine and of satisfactory resistance to light. Acele Scarlet B yields yellow shades of red on both bright and delustered acetate fiber yarn and piecegoods. It penetrates well and exhibits very good general dyeing properties. Celanthrene Navy Blue BP Concentrated, for use on acetate fiber materials, gives full shades of navy of a reddish tone. Fastness and application properties are good. For this reason and because of its desirable shade, it finds use in producing navy blues on dress-goods, draperies and decorative fabrics. New vat colors for printing on delustered rayon are Sulfanthrene Pink FFC Paste, Sulfanthrene Blue 2BDC Extra Paste, and Ponsol Jade Green Supra C Paste, producing respectively pink, medium blue, and bright, bluish green prints of good fastness. Pontamine Fast Black LCW is a direct dyestuff recommended exclusively for dyeing cotton materials containing acetate fibers that are to be left clear. Particularly recommended for producing light and medium grays, although it may also be used for full shades of black. Diagen Red MG Concentrated Solution is a stabilized azoic printing color, producing bright red prints of satisfactory fastness.

Several vat colors manufactured in grain form include:

Ponsol Golden Orange GS Double
Ponsol Golden Orange RRTS Double
Ponsol Brown AGS Double
Ponsol Brown ARS Double
Ponsol Khaki 2GS Double
Sulfanthrene Pink FBS Double
Sulfanthrene Pink FFS Double
Ponsol Red G2BS Double
Ponsol Violet BNXS Double
Ponsol Blue BFS Double
Ponsol Jade Green S Double
Ponsol Olive ARS Double
Ponsol Direct Black 3GS Double

All of these are stable to storage so that there is little possibility of the formation of lumps even after a prolonged period. The vat color grains, because of their excellent state of dispersion and fineness, make it possible to obtain eminently satisfactory results in dyeing by the pigment pad and package machine methods.

General Dyestuff announces: Algosol Brown IBR, yielding reddish brown shades of excellent fastness to light, washing, soda boiling and chlorine. The very good fastness to hot pressing and the fact that it hardly changes its shade under artificial light should be mentioned. In addition, it is very good soluble and possesses but low substantivity for which reason it is very well suitable for padding purposes. Silk Fast Grey B B, a homogeneous dyestuff of very good fastness properties, being well suited for the dyeing of pure and weighted silk and showing a very good dischargeability. Rapidogen Red IGG, produces very bright red shades of very good fastness to light, washing and chlorine.



Just try to hurry your sister!

BETTY is dripping with water—but Brother Joe is dripping with indignation. He has to meet his "date" in twenty minutes, and Betty has been bathing for the last half hour. (That's what Joe says, anyway.)

Inside the shower curtain, Betty is blissfully forgetful of time, lost in the luxury of steaming spray and the creamy suds of her fragrant gardenia soap.

There's no reason, of course, why she should know the part that chemical research plays in this bath-taking. But the soap is scented with a Du Pont aromatic, and the curtain fabric is made of "Acele," Du Pont's acetate yarn.

Even the water that cascades over her smooth shoulders has arrived by way of aqueducts that pierce rocky hills through the constructive power of dynamite.

Such a little incident in the day—*a bath*. Yet it is a good example of the way research chemists constantly add to your enjoyment by means of useful Du Pont products.

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ORGANIC CHEMICALS DEPARTMENT . . . . WILMINGTON, DELAWARE

U. S. Chemical Patents

A Complete Check-List of Products, Chemicals, Process Industries

Agricultural Chemicals

Production ammonia-water-sodium nitrate mixture. No. 2,035,484. Walter H. Kniskern, Prince George County, Va., and Charles K. Lawrence, Syracuse, N. Y., to Atmospheric Nitrogen Corp., N. Y. City.

Production potassium nitrate. No. 2,035,804. Karl Haase and Hellmut Werth, Bleicherode-am-Hartz, Germany, to firm Preussiche Bergwerks-und Hutten Aktiengesellschaft, Berlin, Germany.

Production and purification of phosphoric acid. No. 2,035,850. Robert E. Vivian to General Chemical Co., both of N. Y. City.

Production granulated fertilizer by mixing calcium cyanamid with calcium nitrate solution and urea. No. 2,035,866. George C. Cox, Niagara Falls, N. Y., to American Cyanamid Co., N. Y. City.

Process of treating rock phosphate. No. 2,036,244. Bengt Wadsted, Copenhagen, Denmark, to Markus Larsson, Berlin, Germany.

Production phosphate fertilizer by treating phosphate rock with sulfuric acid and ammonium sulfate. No. 2,036,494. James K. Plummer, Atlanta, Ga., to Tennessee Corp., N. Y. City.

Production mixed fertilizers by introducing nitric acid into ammonium phosphate solution. No. 2,036,701. Carl Kircher and Karl Otto Schmitt, Ludwigshafen-am-Rhine, Germany, to I.G., Frankfort-am-Main, Germany.

Production of calcium phosphates by reacting phosphoric acid with a low silica dead burned lime. No. 2,036,760. William H. Knox, Jr., Nashville, Tenn., to Victor Chemical Works, a corp. of Ill.

Superphosphate nitrifying agent comprising a liquid containing free ammonia and urea. No. 2,036,870. Edward W. Harvey, New Brunswick, N. J., to The Barrett Co., N. Y. City.

Production ammoniated superphosphates. No. 2,037,706. Harry A. Curtis, Knoxville, Tenn., to T.V.A., Wilson Dam, Ala.

Cellulose

Production and treatment of cellulose derivatives. No. 2,034,713. Henry Dreyfus, London, England.

Production cellulose films, foils, or sheets. No. 2,034,716. Henry Dreyfus, London, England.

Production colored soluble cellulose using alcohol insoluble pigment particles dispersed in an alcoholic medium. No. 2,034,861. Emile De Stubner, Detroit.

Production mixture of a cellulose derivative with diglycerine tetraacetate. No. 2,035,183. Richard Muller, Mannheim, and Fritz Muller, Mannheim-Waldhof, Germany, and Heinrich Messer, Croydon, England, to C. F. Boehringer & Soehne G. m. b. H., Mannheim-Waldhof, Germany.

Production transparent cellulose hydrate foil. No. 2,035,645. Rudolf Etzkorn and Ewald Knehe, Wuppertal-Barmen, Germany, to I. P. Bembery Aktiengesellschaft, Wuppertal-Oberbarmen, Germany.

Process increasing the solubility of cellulose ethers. No. 2,036,257. James Craik, Stevenston, Scotland, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production cellulose acetate compositions. No. 2,036,271. Frederick C. Hahn to E. I, du Pont de Nemours & Co., both of Wilmington, Del.

Use of cellulose derivative solvent. No. 2,036,303. George W. Seymour, Cumberland, Md., to Celanese Corp. of America, a corp. of Del.

Process of treating cellulose derivative sheets. No. 2,036,377. Jackson B. Wells to Eastman Kodak Corp., both of Rochester, N. Y.

Fibrous esterification of cellulose using homogenizers of the benzene series. No. 2,036,382. Edward C. Yackel and William O. Kenyon to Eastman Kodak Co., all of Rochester, N. Y.

Process of refining cellulose acetate. No. 2,036,397. Gerard J. Clarke, Rochester, and Hans T. Clarke, N. Y. City, to Eastman Kodak Co., Rochester, N. Y.

Production sulfonic acid esters of cellulose. No. 2,036,423. Carl J. Malm and Gale F. Nadeau to Eastman Kodak Co., Rochester, N. Y.

Production nonhalation photographic film. No. 2,036,440. Alfred D. Slack to Eastman Kodak Co., both of Rochester, N. Y.

Chemical purification and modification of cellulose fiber. No. 2,036,606. George A. Richter to Brown Co., both of Berlin, N. H.

Production cellulose acetate. No. 2,036,947. Ralph H. McKee, Jersey City, and Earle H. Morse, Nutley, N. J.

Production photographic film comprising emulsion layer carrying a silver salt and a leuco base dye in the body. No. 2,036,994. Donald K. Allison, Beverly Hills, Cal., to Detracolor Ltd., a corp. of Nev.

Production cellulose composition comprising cellulose derivatives and oxanones. No. 2,037,010. Henry Dreyfus, London, England.

Production and treatment of cellulose derivatives. No. 2,037,011. Henry Dreyfus, London, England.

Method curing cellulose derivative sheeting. No. 2,037,704. Emmett K. Carver to Eastman Kodak Co., both of Rochester, N. Y.

Production cellulose derivative containing water-insoluble ether of a sugar as plasticizer. No. 2,037,740. Paul L. Salzberg to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Coal Tar Chemicals

Production quinoline derivatives. No. 2,034,983. Heinrich Jensch, Frankfort-am-Main, Germany, to Winthrop Chemical Co., Inc., N. Y. City.

Production chlorinated indanthrone compounds. No. 2,035,459. Edward Burgoine and Charles William Soutar, Manchester, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production of quinaldines. No. 2,035,751. Max Albert Kunz, Mannheim, and Gerd Kockendoerfer and Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production of phenol by reacting benzene with hydrogen chloride and oxygen. No. 2,035,917. Walter Prahl and Wilhelm Mathes to Dr. F. Raschig G. m. b. H., all of Ludwigshafen-am-Rhine, Germany.

Production 1:2—diaminobenzene. No. 2,036,134. Charles Graenacher and Richard Sallman to firm Society of Chemical Industry in Basle, all of Basel, Switzerland.

Production of halogen alkane-sulfonic acids. No. 2,036,249. Roger Adams, Urbana, Ill., Harry Eatough, Wilmington, Del., and Carl S. Marvel, Urbana, Ill., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production sulfo-aromatic derivatives of hendecenoic acid. No. 2,036,402. Melvin De Groote, St. Louis, and Bernhard Keiser, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.

Production of styrene from aromatic hydrocarbon vapors. No. 2,036,410. George D. Graves to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production halogenated indigos. No. 2,036,487. Theodore L. Masterson, Snyder, N. Y., to National Aniline & Chemical Co., Inc., N. Y. City.

Production conversion products of N-nitramines of primary aromatic amines which are nitrated in the nucleus. No. 2,036,530. Oskar Knecht, Binningen, near Basel, Markus Kappeler, Basel, and Carl Apotheker, Riehen, near Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Production alkylated aromatic carboxylic sulfonic acids. No. 2,036,593. Ernst Alfred Mauersberger, Maarssen, near Utrecht, Netherlands.

Separation of 1,8- and 1,5-naphthylamine-sulfonic acids. No. 2,036,661. John M. Tinker, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Treatment of alkali metal phenolate solutions from ammonia still liquors to produce phenol. No. 2,037,295. Benjamin W. Winship, Orchard Park, N. Y., to Bethlehem Steel Co., a corp. of Pa.

Production Thioflavine T by reacting dihydrothio-p-toluidine with methyl alcohol and sulfuric acid. No. 2,037,448. Otto Allemann to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production light sensitive materials containing that type diazo compounds. No. 2,037,542. Maximilian Paul Schmidt and Robert Franke to Kalle & Co., all of Wiesbaden-Biebrich, Germany.

Production organic carboxylic acids by reacting an aliphatic ketone with steam and carbon monoxide. No. 2,037,654. Alfred T. Larson to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Corrosion inhibitor comprising reaction product of crude, high-boiling coal tar distillate and an aralkyl halide. No. 2,037,762. Percy Julius Cole, Philadelphia, to The Barrett Co., N. Y. City.

Coatings

Process for coating glass sheets with algaline silicates and fluosilicates. No. 2,034,987. Kikujiro Morita, Paris, France.

Production protective coating composition comprising tung oil and a phenol-aldehyde resin. No. 2,035,250. Charles A. Thomas to Monsanto Petroleum Chemicals, Inc., both of Dayton, Ohio.

Production protective coating composition comprising tung oil, a coumarone-indene resin, a drier, and a phenolic crystallization inhibitor. No. 2,035,251. Charles A. Thomas to Monsanto Petroleum Chemicals, Inc., both of Dayton, Ohio.

Production drying oils for use in varnishes. No. 2,035,455. August P. Bjerregaard, Okmulgee, Okla., to The Gray Processes Corp., Newark, N. J.

Production pigmented coating composition comprising acetylene polymer as vehicle and pigment of asbestine, barytes, blanc fixe and stearic acid. No. 2,036,300. Ernest Rodman, Marshallton, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Manufacture of coated sheet metal. No. 2,036,615. Raymond J. Wean to The Wean Engineering Co., both of Warren, Ohio.

Production firmly adherent galvanic coatings of aluminum and aluminum alloys. No. 2,036,962. Johannes Fischer, Berlin-Charlottenburg, Germany, to Siemens & Halske, Aktiengesellschaft, Siemensstadt, near Berlin, Germany.

Production of pigmented film-forming compositions. No. 2,037,322. Henry A. Gardner, Washington, D. C.

Surface coating material and process. No. 2,037,398. Gabriel Smith, Leyton, London, England.

Surface finish comprising baked synthetic resin coating and a dissimilar finish coating. No. 2,037,710. Carleton Ellis, Montclair, N. J., to Ellis-Foster Co., a corp. of N. J.

Production nitrocellulose crystallizing lacquer. No. 2,037,734. Theodore A. Neuhaus, Lakewood, Ohio, to The Glidden Co., Cleveland, Ohio.

Production asphalt coating material. No. 2,038,023. Wallace A. Craig, Los Angeles, and Fred E. Griffith, Long Beach, Cal., to William C. McDuffie, receiver for Richfield Oil Co. of Cal., Los Angeles.

Production varnish material containing synthetic urea-formaldehyde varnish and finely ground paper fibres. No. 2,038,345. John D. Cochrane, Jr., to The Formica Insulation Co., both of Cincinnati, Ohio.

Anticorrosive paint. No. 2,038,444. Alphonse Friedrich Manfred Ragg Neu-Wentorf, near Hamburg, Germany.

Dyes, Stains, etc.

Production sulfuric acid esters of vat dyestuffs leuco derivatives. No. 2,035,325. Hans Lecher and Bernhard Bollweg, Leverkusen-I. G. Werk, and Wilhelm Bauer and Ludwig Zeh, Leverkusen-Wiesdorf, Germany, to Durand & Huguenin A.-G., Basel, Switzerland.

Patents digested include issues of the "Patent Gazette," Mar. 24 through Apr. 21, inclusive.

Production sulfuric acid esters of vat dyestuffs leuco derivatives. No. 2,035,361. Wilhelm Bauer and Ludwig Zeh, Wiesdorf, and Bernhard Bollweg, Leverkusen-am-Rhine, Germany, to Durand & Huguenin A.-G., Basel, Switzerland.

Production stable sulfuric acid esters of vat dyestuffs leuco derivatives. No. 2,035,362. Wilhelm Bauer and Ludwig Zeh, Wiesdorf, and Bernhard Bollweg, Leverkusen-am-Rhine, Germany, to Durand & Huguenin A.-G., Basel, Switzerland.

Development of ice color printings and dyeings. No. 2,035,518. Frithjof Zwilgmeyer, Gordon Heights, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production monoazo dyestuffs. No. 2,036,122. Achille Conzetti to firm J. R. Geigy A. G., both of Basel, Switzerland.

Production azo dyestuffs. No. 2,036,159. Mordecai Mendoza, Blackley, Manchester, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production blue to black dyeing sulfurized dyestuffs. No. 2,036,186. Andre Catineau, St. Fons, near Lyon, France, and Ernst Dur, Basel Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Process of dyeing textile fibers with organic dyestuffs. No. 2,036,196. Norman Chappell, Norman Hulton Haddock, and Frank Lodge, Blackley, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production anthraquinone lactam dyestuffs. No. 2,036,202. Samuel Ellingworth, Norman Hulton Haddock, Frank Lodge, and Colin Henry Lumsden, Blackley, Manchester, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production anthrimide carbazole dyestuffs of the anthraquinone-acridone series. No. 2,036,663. Henry J. Weiland, South Milwaukee, and William Dettwyler, Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process dyeing wool with single bath chromium compound. No. 2,036,703. Hans Krzikalla and Walter Limbacher, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production vattable dipyridino-anthanthrones which may be halogenated. No. 2,036,705. Max Albert Kunz, Mannheim, Switzerland, and Karl Koeberle and Gerd Kochendoerfer, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production insoluble disazo dyestuffs of the benzidine series. No. 2,036,944. Adolf Krebser to firm of J. R. Geigy A. G., both of Basel, Switzerland.

Production flaked sulfur dyes. No. 2,037,005. William S. Calcott, Pennsgrove, N. J., Herbert A. Lubs, Wilmington, Del., and George Barnhart, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production monoazo dye. No. 2,037,909. Arthur Howard Knight, Blackley, Manchester, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Process of dyeing cellulose esters and ethers. No. 2,037,910. Arthur Howard Knight, Ashton-on-Mersey, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production water-insoluble azo-dyestuffs and fiber dyed therewith. No. 2,038,081. Leopold Laska, Offenbach-am-Main, Arthur Zitscher, Kronberg-im-Taunus, and Wilhelm Seidenfaden, Offenbach-am-Main, Germany, to General Aniline Works, Inc., N. Y. City.

Production amine salts of dyestuffs containing one or more acid groups. No. 2,038,298. Harry George Kiernan, Buffalo, N. Y., to National Aniline & Chemical Co., N. Y. City.

Production indigoid dyestuffs. No. 2,038,364. Eduard Kambli and Jaroslaw Frohlich, Basel, and Ernst Stocklin, Binningen, near Basel, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Explosives

Production propellant powder consisting of nitrocellulose and triacetin. No. 2,035,471. George C. Hale and Donald R. Cameron, Dover, N. J.

Ammunition priming mixture comprising potassium chlorate, potassium ferrocyanide and glass. No. 2,035,597. Joseph Doerfer, deceased; and Jacob Doerfer, executor of deceased; George Malcolm, administrator for Jacob Doerfer.

Use of zirconium as fuel in ammunition priming mixture. No. 2,036,119. Gordon H. Chambers to Foote Mineral Co., both of Philadelphia.

Production ammunition priming mixture containing lead trinitrorescorcinate, guanylnitrosoamino-guanyltetracene and zirconium. No. 2,038,097. James E. Burns, Bridgeport, Conn., to Remington Arms Co., Inc., a corp. of Del.

Fine Chemicals

Production tertiary butyl acetyl halide. No. 2,034,850. Frank C. Whitmore, State College, Pa., and August H. Homeyer, St. Louis, Mo., to Mallinckrodt Chemical Works, St. Louis, Mo.

Production stable solutions of dihydroxy-diamino-arsenobenzene and its derivatives. No. 2,035,153. Franz Elger, Basel, Switzerland, to Hoffman-LaRoche, Inc., Nutley, N. J.

Cyclic production of para amino phenol. No. 2,035,292. Johann A. Bertsch to Monsanto Chemical Co., both of St. Louis, Mo.

Production 5-isopropyl-5-furomethyl barbituric acid. No. 2,035,317. Gustav Heilner, Berlin-Fichtengrund, Germany, to firm Chemische Fabriken Dr. Joachim Wiernik & Co., Aktiengesellschaft, Berlin-Waidmannslust, Germany.

Production condensation products of halogenated aliphatic ethers. No. 2,035,386. Paul L. Salsberg to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production dichloracetic acid by reacting pentachlorethane with sulfuric acid. No. 2,036,137. Alfred Guyot, Salindres, France, to "Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges et Camargue," Paris, France.

Production esters by reacting an amide with a hydroxyl group in presence boron fluoride. No. 2,036,353. Julius A. Nieuwland and Frank J. Sowa, Notre Dame, Ind., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production alkyl esters of 4-chloro resorcinol. No. 2,036,827. Roland R. Read, Kirkwood, Mo., to Lambert Pharmacal Co., Wilmington, Del.

Production alginic acid. No. 2,036,922. Donald E. Clark and Harland C. Green, San Diego, Cal., to Kelco Co., Los Angeles.

Production alginic acid. No. 2,036,934. Harland C. Green, San Diego, Cal., to Kelco Co., Los Angeles.

Process converting alkali salts of phenylalkyl barbituric acids into stable calcium compounds. No. 2,036,935. Paul Reinhold Gruter, Berlin-Charlottenburg, Germany.

Production gum-free oxygenated hydrocarbon products. No. 2,037,050. Alfred Schaarschmidt, deceased, late of Berlin-Charlottenburg, Germany; by Erna Magda Schaarschmidt, heiress; to Antares Trust Reg., Vaduz, Liechtenstein.

Production salts of tetrahydro-N-methyl nicotinic acid-methylester with amino-substituted arsonic acids. No. 2,037,112. Max Bockmuhl and Gustav Ehrhart, Frankfort-am-Main, Germany, to Winthrop Chemical Co., N. Y. City.

Production mono-acetoxy-mercuri-alkyl-phenol-sulfonic acid. No. 2,037,371. Emil Conrad Fanto, Fairfield, and Allen Llewellyn Omohundro, Wilton, Conn., to McKesson & Robbins, Inc., Bridgeport, Conn.

Production alkali metal xanthate of a monohydric, aliphatic, saturated secondary alcohol. No. 2,037,437. Ludwig Rosenstein, San Francisco, Cal., to American Cyanamid Co., a corp. of Me.

Production organic compounds capable of splitting off halogen. No. 2,037,442. Heinrich Ulrich and Paul Koerding, Ludwigshafen-am-Rhine, to I. G., Frankfort-am-Main, Germany.

Reduction of organic esters, phenols, aldehydes, ketones, nitro derivatives, and sulfonates. No. 2,037,712. Clarence J. Frankforter, Lincoln, Neb., and Dwight B. Mapes, Wilmington, Cal., to Frankforter Oil Process, Inc., Omaha, Neb.

Production xanthate of monohydric primary alcohol containing from 17 to 18 carbon atoms. No. 2,037,717. George De Witt Graves to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production substantially pure xanthate of aliphatic primary alcohol containing 6 to 15 carbon atoms. No. 2,037,718. George De Witt Graves to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production hydroaromatic alcohols. No. 2,037,876. Euclid W. Bousquet to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production salts and compounds of mercapto thiazole compounds. No. 2,037,878. Adrien Cambron, Ottawa, Ontario, Canada, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production sulfonic acids of higher aliphatic ketones. No. 2,037,974. Fritz Guenther and Hermann Holsten, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production beta-chloro-alkyl esters of aliphatic acids. No. 2,038,074. Edgar C. Britton and Gerald H. Coleman to The Dow Chemical Co., all of Midland, Mich.

Production new uric acid-dissolving remedies. No. 2,038,484. Jon Gaathaug, Oslo, Norway.

Glass and Ceramics

Production heat absorbing glass. No. 2,034,994. Donald Ellsworth Sharp and James Bailey, Hamburg, N. Y., to Mississippi Glass Co., N. Y. City.

Metallic treatment of vitreous materials. No. 2,035,015. Rens E. Schirmer, N. Y. City.

Production reduced borosilicate glass. No. 2,035,318. Harrison P. Hood to Corning Glass Works, both of Corning, N. Y.

Production ceramic body. No. 2,036,190. Raymond C. Benner and Henry N. Baumann, Jr., to The Carborundum Co., all of Niagara Falls, N. Y.

Production of clay for use in suspensions. No. 2,036,617. Paul Bechtner and Winfred B. Hirschmann to American Colloid Sales Division, Inc., all of Chicago.

Production laminated refractory material. No. 2,037,294. Roger W. Williamson, Baltimore, Md.

Production refractory material molded article. No. 2,038,034. Albert A. Fowler, North Hollywood, and Russell M. Otis, Pasadena, Cal.

Production concrete having high electric insulation resistance. No. 2,038,367. Emile Pierre Claudius Lambert, Paris, France.

Reduction of refractory oxides. No. 2,038,402. Peter P. Alexander, Marblehead, Mass., to General Electric Co., a corp. of N. Y.

Production laminated glass. No. 2,038,494. Adolf Kampfer, Berlin, Germany.

Industrial Chemicals, etc.

Production lower aliphatic anhydride. No. 2,034,714. Henry Dreyfus, London, England.

Production alkaline earth metal carbonates for use as fillers. No. 2,034,797. John W. Church and Raymond R. McClure to Pure Calcium Products Co., all of Painesville, Ohio.

Dry cell with zinc anode, carbon cathode and a cellulose fiber mix. No. 2,034,817. Adger S. Johnson, Lakewood, Ohio, to National Carbon Co., a corp. of N. Y.

Treatment of waste organic liquors using barium and calcium oxide. No. 2,034,833. Erik Ludvig Rinman, Djursholm, Sweden.

Process for absorption of nitrogen oxides. No. 2,034,863. Stanley L. Handforth, Woodbury, and Albert F. Kozak, Elizabeth, N. J., and E. I. du Pont de Nemours & Co., Wilmington, Del.

Production ammonium salts by reacting ammonia with aqueous acid. No. 2,034,864. Stanley L. Handforth, Woodbury, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production oxidation reaction catalysts. No. 2,034,896. William S. Calcott and William A. Douglass, Pennsgrove, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production of halogenated hydrocarbons. No. 2,034,962. Omar H. Smith, West Englewood, N. J., to U. S. Rubber Co., N. Y. City.

Joint production of a soda lye, poor in sodium chloride, and of Glauber salt. No. 2,034,999. Karl Staib and Herman Heres, Rheinfelden in Baden, Germany, to I. G., Frankfort-am-Main, Germany.

Production alkali cyanides by treating alkali sulfocyanates with reducing agents at high temperatures. No. 2,035,030. Arnoud Willy van Seters to N. V. Stikstofbindingsindustrie "Nederland," both of Dordrecht, Netherlands.

Production hydrogen peroxide by oxidizing an amino aromatic hydrazo compound in an aqueous medium. No. 2,035,101. Edward Cornelius Soule, Niagara Falls, N. Y., to The Mathieson Alkali Works, N. Y. City.

Purification and separation of sulfonate mixtures. No. 2,035,106. Hans G. Vesterdal and Ejnar W. Carlson, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Del.

Process of rendering animal fats from tissues using activated carbon. No. 2,035,126. John P. Harris, Wilmette, Ill., to Industrial Chemical Sales Co., N. Y. City.

Use of carbon dioxide in vapor phase treatment of unsaturated hydrocarbons. No. 2,035,189. Alexander S. Ramage to Merlin Wiley and Ora L. Smith, trustees, all of Detroit.

Paste for lead storage battery electrodes containing sodium boro-phosphate. No. 2,035,315. Harold R. Harner and Melvin F. Chubb, Joplin, Mo., to The Eagle-Picher Lead Co., Cincinnati, Ohio.

Preservation of organic solvents using an ether of a hydroxyalkylamine. No. 2,035,383. Henry L. Cox, South Charleston, W. Va., to Carbide & Carbon Chemicals Corp., a corp. of N. Y.

Removing organic impurities from crude silver iodide using oxidizing salt. No. 2,035,431. Sheldon B. Heath and Maurel F. Olman to The Dow Chemical Co., all of Midland, Mich.

Treatment of impure antimony trioxide. No. 2,035,453. Jesse O. Betterton, Metuchen, and Roy D. McLellan, Woodbridge, N. J., to American Smelting & Refining Co., N. Y. City.

Production pure, white antimony trioxide. No. 2,035,454. Jesse Oatman Betterton, Metuchen, N. J., to American Smelting & Refining Co., N. Y. City.

Flotation of copper sulfides with nickel activators. No. 2,035,458. Frederic A. Brinker, Denver, Colo.

Production magnesium hydroxy monohydrate. No. 2,035,460. Heinz H. Chesny, San Mateo, Cal., to Marine Chemicals Co., Ltd., San Francisco.

Production purified para amino phenol. No. 2,035,502. Iwan Ostromislensky and Alexander V. Tolstoouhov to Ostro Research Laboratories, Inc., N. Y. City.

Production purified amino phenol salt. No. 2,035,510. Serge Semenoff, Bronx, N. Y., to Ostro Research Laboratories, Inc., N. Y. City.

Separation of gaseous mixtures of methane, ethane and propane. No. 2,035,516. Walter Wilkinson, Rye, N. Y., and Joseph L. Schlitt, Darien, Conn., to Air Reduction Co., Inc., N. Y. City.

Halide recovery process. No. 2,035,523. Harry E. Bierbaum to General Salt Co., Ltd., both of Long Beach, Cal.

Separation of nitrogen bases from crude materials. No. 2,035,584. James R. Bailey, Austin, Tex., to Union Oil Co., of Cal., Los Angeles.

Refining of vegetable and animal oils and fats by dissolving in alcohol-water-alkali mixture. No. 2,035,589. Otto Brucke, Zurich, Switzerland, to American Lurgi Corp., N. Y. City.

Production coated catalysts. No. 2,035,606. Alphons O. Jaeger, Mount Lebanon, Pa., to American Cyanamid & Chemical Corp., a corp. of Del.

Cleansing process. No. 2,035,652. Ralph E. Hall, Mount Lebanon, Pa., to Hall Laboratories, Inc., Pittsburgh, Pa.

Purification of naphthenic acids. No. 2,035,741. Frederick J. Ewing, Pasadena, Cal., to Union Oil Co. of Cal., Los Angeles.

Deodorizing and decolorizing of naphthenic acids. No. 2,035,742. Frederick J. Ewing, Pasadena, Cal., to Union Oil Co. of Cal., Los Angeles.

Method of effecting rapid liberation of oxygen from sodium perborate. No. 2,035,896. Frank C. Kerwin, Brooklyn, N. Y.

Production ammonium sulfate from sulfur dioxide and ammonia. No. 2,035,920. Frederic Marinus Pyzel, Piedmont, Cal., to Shell Development Co., San Francisco.

Production hard board products from cellulosic material by use of phenol. No. 2,036,156. Thor Axel Ivar Lundback to Aktiebolaget Mo Och Domsjo Wall-Board Co., both of Ornskoldsvik, Sweden.

Production of distilled alcoholic liquors. No. 2,036,167. Edwin E. Cox, Los Angeles, Cal., to Industrial Laboratories, Ltd., Chicago.

Production composite material comprising heat-treated vermiculite, bentonite, asbestos and water. No. 19,919—reissue. Paul Bechtner, Chicago, to American Colloid Co., Lead, S. Dak.

Recovery of iodine from brines using an alginic radical. No. 2,036,214. Laurence E. Harrison, Los Angeles, Cal., to 10-Dow Chemical Co., Long Beach, Cal.

Production zirconium silicate by treatment of zirconium ores. No. 2,036,220. Charles L. Kinzie, Niagara Falls, N. Y., to The Titanium Alloy Mfg. Co., N. Y. City.

Purification of zirconium silicate. No. 2,036,221. Charles J. Kinzie, Niagara Falls, N. Y., to The Titanium Alloy Mfg. Co., N. Y. City.

Production electropositive pulverulent filter aid comprising finely divided diatomaceous earth. No. 2,036,258. Arthur B. Cummins, Plainfield, N. J., to Johns-Manville Corp., N. Y. City.

Production insulating liquid comprising a halogenated hydrocarbon and a zinc oxide as neutralizer. No. 2,036,274. Homer D. Holler, Wilkinsburg, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Production formals of aliphatic partial ethers of polyhydric alcohols. No. 2,036,304. George W. Seymour, Cumberland, Md., to Celanese Corp. of Am., a corp. of Del.

Production chlorine dioxide. No. 2,036,311. James F. White, Niagara Falls, N. Y., to The Mathieson Alkali Works, Inc., N. Y. City.

Production hydrated olefines. No. 2,036,317. Franklin A. Bent and Simon N. Wik, Berkeley, Cal.

Extraction of potassium salts from aqueous mixtures. No. 2,036,364. Eugene P. Schoch, Austin, Tex.

Production chlorine dioxide by separation of chlorine-chlorine dioxide mixtures, using metal oxides or salts as contacting agents. No. 2,036,375. George Paul Vincent, Niagara Falls, N. Y., to The Mathieson Alkali Works, Inc., N. Y. City.

Production ash-free adsorbent carbon from sucrose solution. No. 2,036,380. Charles G. Wortz to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production of dilute sulfuric acids. No. 2,036,412. Friedrich August Henglein, Cologne-Deutz, and Freidrich Wilhelm Stauff, Leverkusen-Weisdorf, Germany, to I. G., Frankfort-am-Main, Germany.

Production granular aluminum hydroxide. No. 2,036,508. Svend S. Svendsen, Madison, Wis., to Clay Reduction Co., Chicago.

Production carbon dioxide from limestone. No. 2,036,517. Murray N. Colman, Los Altos, Cal.

Electrolyte for electrolytic condensers. No. 2,036,669. Victor Yngve, Lakewood, Ohio, to Union Carbide & Carbon Corp., a corp. of N. Y.

Method of treating lead sulfide suspensions in alkaline solution. No. 2,036,839. Charles F. Teichmann to The Texas Co., both of N. Y. City.

Production of solvent from glycerol. No. 2,036,940. Eric Leighton Holmes, Teddington, England.

Production of saponified material. No. 2,037,004. Ralph Everett Burns, Los Angeles, Cal., to Refining, Inc., Reno, Nev.

Contact process for sulfuric acid production. No. 2,037,028. Alphons O. Jaeger, Crafton, Pa., to American Cyanamid & Chemical Corp., a corp. of Del.

Production of acetylene gas over hot refractory. No. 2,037,056. Robert G. Wulff to Wulff Process Co., both of Los Angeles.

Chemical refining of crude beeswax. No. 2,037,111. Charles Stewart Bisson and Walter Brown Dye, Davis, Cal.

Production sulfonic acids. No. 2,037,299. Fritz Gunther and Josef Hetzer, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production non-structural activated carbon. No. 2,037,257. Jacque C. Morrell, Oak Park, Ill.

Production of filtering medium by immersing cotton in sodium phosphate solution. No. 2,037,370. Gustavus J. Esselen, Swampscott, and William F. Talbot, Auburndale, Mass., to Union Wadding Co., Pawtucket, R. I.

Production nitriles of higher unsaturated fatty acids. No. 2,037,389. Otto Nicodemus, Frankfort-am-Main, Hochst, and Otto Wulff, Konigstein, Germany, to I. G., Frankfort-am-Main, Germany.

Production halogenated hydrocarbons. No. 2,037,419. Arthur Andrew Levine and Harlan A. Bond, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Dehydration and purification of carbon dioxide gas. No. 2,037,685. Edwin C. Holden to The Davison Chemical Corp., both of Baltimore, Md.

Carburizing process starting with liquid propane. No. 19,936—reissue. Adolph W. Machlet, Elizabeth, N. J.

Production compositions by mixing asphalt and rubber emulsions. No. 2,037,948 Carl David Svensson to Lilly Augusta Svensson, both of Stockholm, Sweden.

Production sodium sesquicarbonate from bicarbonate. No. 2,038,025. George Lewis Cunningham, Robert B. MacMullin, and Homer Louis Robson, Niagara Falls, N. Y., to The Mathieson Alkali Works, Inc., N. Y. City.

Production gypsum crystals. No. 2,038,072. Alvin C. Wilson to The Davison Chemical Corp., both of Baltimore, Md.

Purification of sulfuric acid using one of the group titanium, zirconium, hafnium. No. 2,038,078. William Hardiek to The Davison Chemical Corp., both of Baltimore, Md.

Process for decomposition of nitrosyl chloride. No. 2,038,083. Frank O. Lundstrom and Colin W. Whittaker, Washington, D. C.; for free use of the Public.

Use of metallic salts to produce an asymmetrical conducting device. No. 2,038,246. George O. Smith, Bloomfield, N. J., to Bell Telephone Laboratories, Inc., N. Y. City.

Dehydration of aqueous alcohol. No. 2,038,357. William J. Hale, Midland, Mich., and Leo M. Christensen, Ames, Iowa, to The Chemical Foundation, Inc., N. Y. City.

Treatment of siliceous materials. No. 2,038,399. George C. Westby, Seattle, Wash.

Flotation reagent comprising a phosphorus sulfur compound of an alcohol. No. 2,038,400. Francis T. Whitworth, Garfield, Utah

Production sulfuric acid by the contact process. No. 2,038,429. Ingenuin Hechenbleikner to Chemical Construction Corp., both of Charlotte, N. C.

Production hydrogen by contacting water gas with heated Smithsonite. No. 2,038,440. Giulio Natta, Pavia, Italy.

Electrochemical recording of electric currents. No. 2,038,486. Emil Glas, Vienna, Austria.

Production ethyl alcohol by hydrolyzing ethyl sulfate. No. 2,038,512. Robert N. Graham, South Charleston, W. Va., to Union Carbide & Carbon Corp., a corp. of N. Y.

Leather and Tanning

Production synthetic tanning agents. No. 2,036,161. Hermann Schuette, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Metals, Alloys, Ores

Method of smelting matte-forming ores. No. 2,035,016. Ivor J. Simcox and Robert L. Peek, Copper Cliff, Ontario, Canada, to The International Nickel Co. of Canada, Ltd., a corp. of Canada.

Production tin-lead-zinc metallic bonding medium of vitreous inter-body adhering property. No. 2,035,241. J. Showles MacLean to Solder-Seal Corp., both of Toledo, Ohio.

Production glass molding material containing chromium, carbon and iron. No. 2,035,364. Oliver K. Carpenter, New Cumberland, W. Va., to The Duraloy Co., Pittsburgh.

Strontium recovery process. No. 2,035,366. Harvey G. Elledge and Alfred Hirsch to Diamond Alkali Co., all of Painesville, Ohio.

Method of coating zinc or cadmium base metals. No. 2,035,380. Ernest John Wilhelm, Palmerton, Pa., to The N. J. Zinc Co., N. Y. City.

Production alloy containing carbon, manganese, silicon, chromium, copper and iron. No. 2,035,392. Russell H. McCarroll and Gosta Vennerholm to Ford Motor Co., all of Dearborn, Mich.

Production wear resistant cast iron containing carbon, manganese, silicon, copper, phosphorus and iron. No. 2,035,393. Russell H. McCarroll and Gosta Vennerholm to Ford Motor Co., all of Dearborn, Mich.

Production cast steel containing carbon, manganese, silicon, copper and iron. No. 2,035,394. Russell H. McCarroll and Gosta Vennerholm to Ford Motor Co., all of Dearborn, Mich.

Production alloys containing copper as base, and silicon, tin and iron. No. 2,035,414. Richard A. Wilkins to Revere Copper & Brass, Inc., both of Rome, N. Y.

Production corrosion resistant copper base alloys containing copper, silicon, tin, zinc and iron. No. 2,035,415. Richard A. Wilkins to Revere Copper & Brass Inc., both of Rome, N. Y.

Production welding rod alloy using copper, zinc, and either vanadium, titanium or zirconium. No. 2,035,423. Edward S. Bunn to Revere Copper & Brass, Inc., both of Rome, N. Y.

Production of pig iron or steel simultaneously with Portland cement. No. 2,035,550. Ernst Karwat, Grosshesselohe, near Munich, Germany.

Production bimetal solder for aluminum comprising zinc, saltpeter, borax, and tin, with a little rosin. No. 2,035,566. Benedicto Pace, Cruzeiro, Brazil.

Production of carbon-free ferro-chromium. No. 2,035,955. Antonius Foss to Norsk Hydro-Elektrisk Kvaelstofaktieselskab, both of Oslo, Norway.

Preferential sulfatization of complex ores. No. 2,036,015. Sylvester James Broderick and Earl H. Brown, Yellow Springs, Ohio, to Bethlehem Mines Corp., a corp. of Del.

Production die casting alloy containing copper, lead, tin, aluminum, silicon, and zinc. No. 19,915-reissue. John R. Freeman, Jr., Cheshire, Conn., to The American Brass Co., Waterbury, Conn.

Sintered alloy containing carbide and an azotized carbide of the chromium group. No. 2,036,245. Richard R. Walter, Starnberg, Germany.

Permanent magnet alloy. No. 2,036,281. Werner Koster, Dortmund, Germany, to Deutsche Edelstahlwerke Akteingesellschaft, Crefeld, Germany.

Recovery of values from zinc spelter skimmings. No. 2,036,291. Lewis E. McDermut, Chicago, Ill.

Method of coating nickel-chromium wire with insulating layer of oxide. No. 2,036,425. Juan E. Mayoral, N. Y. City, to Driver-Harris Co., a corp. of N. Y.

Production nickel alloy containing also aluminum, chromium and barium. No. 2,036,497. Donald W. Randolph, Flint, Mich., to General Motors Corp., Detroit.

Method of heat treating light metal alloys containing magnesium. No. 2,036,563. Adolf Beck, Bitterfeld, Germany, to Magnesium Development Corp., a corp. of Del.

Production of alloys. No. 2,036,576. Charles Hardy, Pelham Manor, N. Y., to Hardy Metallurgical Co., a corp. of Del.

Recovery of nickel values from lateritic ores. No. 2,036,664. Ernest W. Wescott, Niagara Falls, N. Y.

Aluminum alloy piston material coated with layer of oxide. No. 2,036,740. Helmer Bengston, Indianapolis, Ind., to Aluminum Co. of Am., Pittsburgh.

Electrical make-or-break contact alloy containing silver, copper and nickel. No. 2,037,446. Joseph A. Weiger to P. R. Mallory & Co., both of Indianapolis, Ind.

Welding electrode alloy containing steel base rod, and coated with alloy of carbon, manganese and silicon. No. 2,037,596. Carl M. Schaub, Detroit.

Production chromite refractories from natural chrome ore. No. 2,037,600. Gilbert E. Seil, Cynwyd, Pa., to E. J. Lavino & Co., Philadelphia.

Cleaning stainless steel with solution of electrolyte. No. 2,037,633. James D. Kelvie, Massillon, Ohio, to The Republic Steel Corp., Youngstown, Ohio.

Production metal powders. No. 2,037,672. Walter Zeiss, Berlin-Charlottenburg, Germany.

Production composite nickel-ferrous coated body. No. 2,037,732. William A. Mudge, Huntington, W. Va., to The International Nickel Co., Inc., N. Y. City.

Production nickel or nickel alloy coated metallic product. No. 2,037,733. William A. Mudge, Huntington, W. Va., to The International Nickel Co., Inc., N. Y. City.

Method for direct bonding of rubber and metal. No. 2,037,749. Hal C. Anderson, Highland Park, Mich., to Chrysler Corp., Detroit.

Production copper-selenium alloys. No. 2,038,136. Cyril Stanley Smith, Cheshire, Conn., to The American Brass Co., Waterbury, Conn.

Production copper-silicon-selenium alloys. No. 2,038,137. Cyril Stanley Smith, Cheshire, Conn., to The American Brass Co., Waterbury, Conn.

Electric arc welding alloy containing carbon, manganese, cobalt or nickel, tungsten, molybdenum, vanadium, and iron. No. 2,038,178. Paul E. Jerabek, East Cleveland, Ohio, to The Lincoln Electric Co., Cleveland.

Resistance welding electrode alloy containing cadmium, beryllium, and copper. No. 2,038,390. Horace F. Silliman to The American Brass Co., both of Waterbury, Conn.

Naval Stores

Rosin refining methods to reduce color content. No. 2,035,141. Durain C. Butts, Sandusky, Ohio, to Hercules Powder Co., Wilmington, Del.

Paper and Pulp

Treatment of black liquors. No. 2,036,213. John Arthur Hambly, Three Rivers, Quebec, Canada, to Consolidated Paper Corp. Ltd., Montreal, Quebec, Canada.

Alcoholic treatment of ligneous cellulosic material. No. 2,037,001. Samuel I. Aronovsky, St. Paul, Minn., to The Northwest Paper Co., Cloquet, Minn.

Making of hard boards by preparing aqueous suspension of lignin-cellulose material and aldehyde. No. 2,037,522. Thor Axel Ivar Lundback, Stockholm, Sweden, to Aktiebolaget Mo Och Domsjo Wallboard Co., Ornskoldsvik, Sweden.

Production safety paper containing a soluble ferrocyanide and an alkali salt. No. 2,037,937. Francis L. Simons, Needham, Mass., to George La Monte & Son, Nutley, N. J.

Wrapping paper sheet material containing a coumarin—non-glucoside derivative. No. 2,038,114. Curt Joseph, Berlin, Germany, to Sylvania Industrial Corp., Fredericksburg, Va.

Petroleum Chemicals

Petroleum distillate refining process using alkaline earth metal oxide activated with an alkali metal hydrate. No. 2,034,712. Clinton E. Dolbear to Philip Wiseman, P. Kenneth Wiseman, and Clinton E. Dolbear, all of Los Angeles.

Sweetening of hydrocarbon oils with alkali polysulfides. No. 2,034,837. Walter A. Schulze and Lovell V. Chaney to Philips Petroleum Co., all of Bartlesville, Okla.

Process of breaking water-in-oil type petroleum emulsions. No. 2,034,941. Melvin De Groote, St. Louis, Bernhard Keiser, Webster Groves, and Arthur Wirtel, Richmond Heights, Mo., to Tretolite Co., Webster Groves, Mo.

Process of breaking petroleum emulsions. No. 2,034,963. Charles N. Stehr, Los Angeles, Cal., to Tretolite Co., Webster Groves, Mo.

Production adsorbent clay by bleaching with acid solution. No. 2,034,996. Edward M. Slocum, Macon, Ga.

Treatment of residual oils with a selective solvent. No. 2,035,102. Reginald K. Stratford and George W. Gurd, Sarnia, Ontario, Canada, to Standard Oil Development Co., a corp. of Del.

Production composition obtained from hydrocarbon acid sludge. No. 2,035,112. John C. Bird, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Del.

Process for conversion of mercaptans to other sulfur-organic compounds. No. 2,035,121. Per K. Frolich, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Del.

Conversion of carbonaceous tars, mineral oils, and the like into commercial products. No. 2,035,133. Carl Krauch, Ludwigshafen-am-Rhine, and Matthias Pier, Heidelberg, Germany, to Standard I.-G. Co., Linden, N. J.

Use of sulfuric acid in recovery of lubricating oil. No. 2,035,349. Herschel G. Smith, Swarthmore, Pa., to Gulf Oil Corp. of Pa., Pittsburgh.

Method of dewaxing paraffin distillates. No. 2,035,406. Audsley V. Rhodes, Linden, N. J., to Standard Oil Development Co., a corp. of Del.

Removal of wax from hydrocarbon oil using organic selective solvents. No. 2,035,490. Bernard Y. McCarty, Beacon, N. Y., and William E. Skelton, Fort Worth, Tex., to The Texas Co., N. Y. City.

De-waxing hydrocarbon oils. No. 2,035,491. Bernard Y. McCarty, Beacon, N. Y., and William E. Skelton, Fort Worth, Tex., to The Texas Co., N. Y. City.

Process for separating and purifying organic nitrogen bases from petroleum fractions. No. 2,035,583. James R. Bailey, Austin, Tex., to Union Oil Co. of Cal., Los Angeles.

Use of aqueous zinc salt solution in petroleum refining. No. 2,035,607. Arthur Lachman, Berkeley, Cal., to Vapor Treating Processes, Inc., Los Angeles.

Petroleum refining process using zinc salt solution. No. 2,035,608. Arthur Lachman, Berkeley, Cal., to Vapor Treating Processes, Inc., Los Angeles.

Use of aqueous copper salt solution in petroleum refining. No. 2,035,609. Arthur Lachman, Berkeley, Cal., to Vapor Treating Processes, Inc., Los Angeles.

Purification of petroleum oils with aluminum salts. No. 2,035,610. Arthur Lachman, Berkeley, Cal., to Vapor Treating Processes, Inc., Los Angeles.

Continuous chemical treatment of petroleum oil. No. 2,035,655. Leo D. Jones to The Sharples Specialty Co., both of Philadelphia.

Process for decolorizing and deodorizing naphthenic acids. No. 2,035,696. Frederick J. Ewing, Pasadena, Cal., to Union Oil Co. of Cal., Los Angeles.

Removal of tar acids from tars. No. 2,035,868. Richard F. Davis to Universal Oil Products Co., both of Chicago.

Removal of gum-forming olefins from fuel gases by contacting with an aromatic hydrocarbon. No. 2,035,889. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago.

Production complex derivatives of organic mercapto compounds. No. 2,036,208. Adolf Feldt, Berlin-Charlottenberg, Walter Schoeller, Berlin-Westend, and Hans-Georg Allardt, Teltow, Germany, to Schering-Kahlbaum A. G., Berlin, Germany.

Treatment of petroleum sludges and sludge acids. No. 2,036,299. Jack Robinson, Wood River, Ill., to Standard Oil Co., Chicago.

Treatment of petroleum oils using pyridine or hydroquinone as oxidation promoter. No. 2,036,396. Leo P. Chebotar, Beacon, N. Y., to The Texas Co., N. Y. City.

Production petroleum sulfonic acids and sulfonates. No. 2,036,469. Edward Field, Berkeley, Cal., to Standard Oil Co. of Cal., San Francisco.

Production hydrocarbon products by treating petroleum with sulfuric acid and extracting acid sludge. No. 2,036,973. Frederick W. Sullivan, Jr., Hammond, Ind., to Standard Oil Co. (Ind.), Chicago.

Production bituminous road material. No. 2,037,147. John Radcliffe, Shurlock Row, near Twyford, England.

Separation of colloidal matter and other suspended particles from oils. No. 2,037,218. Alfred Walker Empson, Gunnersbury, London, England, to J. Stone & Co., Ltd., Deptford, England.

Refining of sulfur-bearing mineral oil using furfural and furfuryl acetate. No. 2,037,385. Robert E. Manley and Howard H. Gross, Beacon, N. Y., to The Texas Co., N. Y. City.

Thermochemical production of an antidetonating fuel. No. 2,037,478. Erminio Livraghi, Milan, Italy.

Production refined mineral oil composition containing a waxy material. No. 2,037,563. Harry A. Curtis, Woodbury, N. J., to Socony-Vacuum Oil Co., Inc., a corp. of N. Y.

Production of bituminous dispersions. No. 2,037,669. Robert R. Thurston, Beacon, N. Y., to The Texas Co., N. Y. City.

Hydrocarbon oil treatment using hydrogen and a catalyst comprising cobalt thiomolybdate and sodium aluminate. No. 2,037,781. Aristid V. Grosse to Universal Oil Products Co., both of Chicago.

Desulfurization of hydrocarbon oils using hydrogen, a metal oxide, and an aluminate. No. 2,037,789. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago.

Desulfurization of hydrocarbon oils using hydrogen, a metal oxide, and an aluminate. No. 2,037,790. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago.

Treatment cracked hydrocarbon oils using hydrogen and a catalyst comprising a thiomolybdate and an aluminate. No. 2,037,791. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago.

Desulfurization of hydrocarbon oils using hydrogen and various oxide-aluminate catalysts. No. 2,037,792. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago.

Process for breaking water-in-oil type petroleum emulsions using acid-free keto fatty acid body. No. 2,037,885. Melvin De Groote, St. Louis, and Bernhard Keiser and Arthur F. Wirtel, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.

Process for breaking water-in-oil type petroleum emulsions using a salt-free poly keto fatty acid body. No. 2,037,886. Melvin De Groote, St. Louis, and Bernhard Keiser and Arthur F. Wirtel, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.

Hydrocarbon treatment using sulfuric acid. No. 2,038,369. Edouard Georges Marie Romain Lege, Paris, France.

Pigments

Production titanium pigments by hydrolitic precipitation of titanium oxide from solution. No. 2,034,923. Charles L. Schmidt, St. Louis, Mo., to Titanium Pigment Co., Inc., N. Y. City.

Production of zinc oxide. No. 2,036,566. Earl H. Bunce and Harry M. Haslam, Palmerton, Pa., to N. J. Zinc Co., N. Y. City.

Production of zinc oxide. No. 2,036,570. Harlan A. Depew, Palmerton, Pa., to N. J. Zinc Co., N. Y., City.

Production pigments and film-forming compositions containing titanium phthalate. No. 2,037,323. Henry A. Gardner, Washington, D. C.

Resins, Plastics, etc.

Production acid-proof self-hardening compositions containing liquid phenol-formaldehyde resin and neutral aromatic sulfo-chloride. No. 2,034,802. Karl Frank, Karl Dietz and Emil Thiel, Frankfort-am-Main, and Franz Privinsky, Hofheim in Taunus, Germany, to Pen-Chlor, Inc., Philadelphia.

Production molding compositions. No. 2,034,895. William S. Calcott, Pennsgrove, N. J., and Harry Howard Reynolds, Wilmington, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production sulfur resins by reacting aromatic hydroxy compounds with sulfur chloride, sulfur, and an oxygenated hydrocarbon. No. 2,035,098. William Seaman, Glens Falls, N. Y., to Standard Oil Development Co.

Production aldehyde synthetic resins from petroleum. No. 2,035,123. Stewart C. Fulton, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Del.

Production thermoplastic resinous materials. No. 2,035,190. Archibald Renfrew, Giffnock, Scotland, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production prepared resins by polymerizing unsaturated hydrocarbons. No. 2,035,233. Carroll A. Hochwalt, Dayton, Ohio, to Monsanto Petroleum Chemicals, Inc., Dayton, Ohio.

Production plastic nitro-cellulose compositions. No. 2,035,270. Lucas P. Kyrides, Webster Groves, Mo., to Monsanto Chemical Co., a corp. of Del.

Production synthetic resinous reaction product of polycarboxylic acid and an alkyl disubstituted glycol. No. 2,035,314. Virgil L. Hansley and Norman D. Scott, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production synthetic resin of polyhydric alcohol-polycarboxylic acid type. No. 2,035,346. Norman D. Scott, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production resinous reaction product of a polyhydric alcohol, a polycarboxylic acid and a protein, using an alkaline catalyst. No. 2,035,348. Caryl Sly to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production transparent cast phenol-formaldehyde resin. No. 2,035,515. George H. Wilder, Arlington, N. J., to Du Pont Viscoloid Co., Wilmington, Del.

Production emulsions of resins of the polyhydric alcohol polybasic acid type. No. 2,035,520. William Baird, Manchester, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production synthetic resin. No. 2,035,528. Merlin Martin Brubaker to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production synthetic resin by reacting polycarboxylic acid halide and a phenol. No. 2,035,578. Frederick Carver Wagner to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production synthetic resin by condensing wood tar pitch with formaldehyde. No. 2,035,860. William B. Borst and Clarence G. Gerhold to Universal Oil Products Co., all of Chicago.

Production of artificial fibers by mixing polyvinyl ester with aliphatic aldehyde. No. 2,035,939. Maurice Belloc to Societe Nobel Francaise, (Societe Anonyme), both of Paris, France.

Production synthetic resin from polymerized vinyl chloride and a semi-cured alkyd resin. No. 2,036,009. James G. E. Wright, Alplaus, N. Y., to General Electric Co., a corp. of N. Y.

Production vinyl ester resins. No. 2,036,092. George O. Morrison, Frederick W. Skirrow, and Kenneth G. Blaikie, Shawinigan Falls, Quebec, Canada, to Canadian Electro Products Co., Ltd., Montreal, Quebec, Canada.

Production plastic sheet building material. No. 2,036,195. Joseph T. Castles, Jr., Maplewood, N. J.

Production wood and asphalt synthetic compositions. No. 2,036,466. George H. Ellis, St. Paul, Minn., to The Insulite Co., Minneapolis, Minn.

Production plastic composition comprising paraffin wax, rosin, sulfur, and a heat resistant material. No. 2,036,574. Salvatore Gattuso, Ozone Park, N. Y.

Production molded electrical insulating parts. No. 2,036,825. William Edward Pattman, Olton, England, to Bakelite Ltd., London, England.

Formation of sheet pyroxylin. No. 19,926—reissue. Gustavus J. Esselen, Swampscott, Mass., to The Fiberloid Corp., Indian Orchard, Mass.

Production polyvinyl compounds. No. 2,037,012. Henry Dreyfus, London, England.

Method of tempering electric heater shells made of phenol-formaldehyde condensation product. No. 2,037,375. Samuel Freeman, N. Y. City.

Production phenol-aldehyde resins. No. 2,037,585. Frederick M. Murdock, Chicopee Falls, Mass., to The Fiberloid Corp., Indian Orchard, Mass.

Production electric insulating and dielectric compositions. No. 2,037,686. Frank M. Clark, Pittsfield, Mass., to General Electric Co., a corp. of N. Y.

Production solid, fluorescent plastic material. No. 2,037,793. Bernard H. Jacobson, Charleston, W. Va., to Klipstein Chemical Processes, Inc., N. Y. City.

Molding composition comprising heat hardening phenol aldehyde resin, gluten, and wood flour. No. 2,038,113. Kenneth M. Irey, Ridgefield Park, N. J., to Resinox Corp., N. Y. City.

Production amine-formaldehyde synthetic resins. No. 2,038,142. Theodor Sutter, Basel, Switzerland, to Ciba Products Corp., Dover, Del.

Rubber

Rubber vulcanization inhibitor comprising a mercapto aryl thiazole. No. 2,034,889. Carl S. Williams, Woodbridge, N. J. to E. I. du Pont de Nemours & Co., Wilmington, Del.

Color stabilization of rubber surfaces using the halide of an amphoteric element. No. 2,035,062. William C. Geer, Ithaca, N. Y.

Production pulveriform rubber by spraying latex in drying atmosphere. No. 2,035,437. Martinus Joannes Stam, The Hague, Netherlands.

Rubber preservation process using reaction product of phenyl naphthylamine and sulfur chloride. No. 2,035,620. Waldo L. Semon, Silver Lake, Ohio, to The B. F. Goodrich Co., N. Y. City.

Production highly tacky rubber compositions. No. 2,035,698. Harry L. Fisher, Leonia, N. J., to U. S. Rubber Co., N. Y. City.

Method of rubber joining. No. 2,035,819. Evelyn William Madge and Edward Arthur Murphy, Wylde Green, Birmingham, and Francis James Payne, Erdington, Birmingham, England, to Dunlop Rubber Co. Ltd., London, England.

Process stabilizing chlorinated rubber by treating with organic acids alkali metal salts. No. 2,036,997. Karl Bromig to Deutsche Gold-und Silber-Scheideanstalt vormals Roessler, both of Frankfort-am-Main, Germany.

Production vulcanized structure of comminuted cork and rubber. No. 2,037,105. William M. West to Crown Cork & Seal Co., both of Baltimore, Md.

Production rubber latex composition containing rubber latex and formamide. No. 2,037,423. Paul La Frone Magill, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production halogen and oxygen derivatives of rubber. No. 2,037,599. Otto Schweitzer to Metallgesellschaft Aktiengesellschaft, both of Frankfort-am-Main, Germany.

Production moldable compositions by mixing rubber with volatile solvent and asbestos fibre, and crushing the mixture. No. 2,037,687. William Nanfeldt, Clifton, N. J., to World Bestos Corp., Paterson, N. J.

Production dyed rubber products. No. 2,037,898. Merrill E. Hansen to American Anode, Inc., both of Akron, Ohio.

Method retarding rubber deterioration. No. 2,037,932. Waldo L. Semon, Silver Lake Village, Ohio, to The B. F. Goodrich Co., N. Y. City.

Textile, Rayon*

Treatment of textile materials with phosphorescent zinc sulfide. No. 2,033,976. Henry Dreyfus, London, England.

Treatment of filaments, fabrics, etc., using barium chloride, alkali phosphate, and alkali chloride. No. 2,033,977. Henry Dreyfus, London, England.

Alkaline detergent powder comprising alkali-metal hypochlorite solution. No. 2,034,361. Roy C. Sutton, University City, Mo.

Method producing stencils for printing textile fabrics. No. 2,034,437. Josef Kessel, Krefeld-Bockum, Germany.

Process of weighting textiles using a metal salt in a volatile organic solvent. No. 2,034,696. Gustavus J. Esselen, Swampscott, and Walter M. Scott, Wellesley, Mass., to Hooker Electrochemical Co., N. Y. City.

Production artificial wool from viscose using sodium hyposulfite in an acid bath. No. 2,034,711. Henri Chavassieu, Izieux, France, to Du Pont Rayon Co., a corp. of Del.

Production homogeneous solutions of cellulose in acids and production of filaments, etc., therefrom. No. 2,035,148. Jan Cornelius de Nooij, The Hague, and Dirk Jan Gerritsen, Arnhem, Netherlands.

Production of artificial filaments from cellulose derivative spinning solution. No. 2,035,464. Henry Dreyfus, London, England.

Fixation of insoluble metal oxides on textiles. No. 2,035,483. Ernest William Kirk and George Holland Ellis, Spondon, near Derby, England, to Celanese Corp. of Am., a corp. of Del.

Process of delustering textile materials of cellulose derivative composition. No. 2,035,504. Reginald Henry Parkinson and Charles Wesley Addy, Spondon, near Derby, England, to Celanese Corp. of Am., a corp. of Del.

Process rendering fabric resistant to rotting by treatment with chromium sulfate-acetic acid solution and hot alkali. No. 2,035,527. Ralph W. Brown, Belleville, Ill., to Aluminum Co. of Am., Pittsburgh.

Delustering of organic cellulose derivative yarns. No. 2,035,740. Camille Dreyfus, N. Y. City, and William Whitehead, Cumberland, Md., to Celanese Corp. of Am., a corp. of Del.

Recovery of carbon disulfide from viscose products. No. 2,035,981. William F. Richter to Chemical Holding Corp., both of Apollo, Pa.

Production artificial silk. No. 2,035,997. Max Joseph Theumann, Lyon, France, to Du Pont Rayon Co., N. Y. City.

Process of waterproofing cotton textiles. No. 2,036,036. John T. Gibbons, Wilmington, Del., to Joseph Bancroft & Sons Co., Rockford, Wilmington, Del.

Process impregnating cotton textiles with ether or organic acid ester of cellulose. No. 2,036,424. Carl J. Malm to Eastman Kodak Co., both of Rochester, N. Y.

Production imidazole sulfonic acids for use as textile assistants. No. 2,036,525. Charles Granacher to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Production artificial filaments of cellulose derivatives. No. 2,036,860. Camille Dreyfus, N. Y. City, and William Whitehead, Cumberland, Md., to Celanese Corp. of Am., a corp. of Del.

Method of forming cellulose derivative filaments and spinning solution therefor. No. 2,036,861. Camille Dreyfus, N. Y. City, and William Whitehead, Cumberland, Md., to Celanese Corp. of Am., a corp. of Del.

Weighting process of textiles. No. 2,036,862. Camille Dreyfus, N. Y. City, and Herbert Platt, Cumberland, Md., to Celanese Corp. of Am., a corp. of Del.

Production condensation products for use as textile assistants. No. 2,036,932. Friedrich Felix and Jakob Scheidegger to Society of Chemical Industry in Basle, all of Basel, Switzerland.

Production of cellulosic filaments, yarns, etc. No. 2,037,013. Henry Dreyfus, London, England.

Continuous fabric bleaching process using hydrogen peroxide and ammonia. No. 2,037,119. Paul Van A. Comey to R. H. Comey Brooklyn Co., both of Brooklyn, N. Y.

Production staple organic cellulose derivative fibers. No. 2,037,835. William Ivan Taylor, Spondon, near Derby, England, to Celanese Corp. of Am., a corp. of Del.

Production thermo-adhesive textile fabric. No. 2,038,403. Peter J. Ariente to Sayles Finishing Plants, Inc., both of Saylesville, R. I.

Water, Sewage Treatment*

Sewage treatment process using solution of finely divided iron in liquid chlorine. No. 2,034,460. Henry J. Darcey, Oklahoma City, Okla.

Water treating process to retard calcium carbonate precipitation using a soluble meta phosphate. No. 2,038,316. Ludwig Rosenstein to Shell Development Co., both of San Francisco, Cal.

Keeping Qualities of Fats and Oils Determined

Colorimetric methods for determining keeping qualities of fats and oils were described at the Kansas City meeting of the A.C.S. by Dr. George E. Holm and Dr. George R. Greenbank, Research Laboratory of the Bureau of Dairy Industry of the Dept. of Agriculture, and are based on the color changes occurring when solutions of oxidation-reduction indicators are added.

One of these methods is based on the addition of methylene blue to the fat and following the change in color by means of the colorimeter when the solution is exposed to the light of a mazda lamp. The more resistant the color is to change the better will be the keeping quality of the fat. This method previously described has been improved by using a colorimeter recently developed in these laboratories for measuring the color changes in these solutions.

A new oxidation reduction indicator has been discovered which has some advantages over methylene blue. This indicator, known as Wurster Red or dimethyl phenylenediamine, is dissolved in absolute alcohol and added to the fat or oil. A large number of samples of fat may be examined because the colorimeter is used only at the time the measurement is made.

This method makes it possible to select only the samples least susceptible to deterioration. Poor keeping quality does not always indicate that the fat is unfit for use as a food. but does indicate that it should not be placed in storage for any great period of time.

Why soap cleans has been an academic question for years, but, according to W. M. Urbain and L. B. Jensen of Swift's research staff, the explanation is largely due to the fact that soaps are capable of electrifying various materials, as carbon (soot), grease, rust, etc. Authors told an A. C. S. audience in Kansas City last month that, curiously, no other substance has been found which can electrify as well as soap.

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* Includes patents from "Patent Gazette" of Mar. 17.

Non-Ferrous Metals and Alloys in Chemical Equipment

By Frederick A. Rohrman

Aluminum is a comparatively new industrial metal. Despite this and the fact that it does not resist a majority of the more corrosive solutions, it enjoys a unique position among the corrosion-resisting metals. Its light weight and good physical properties make it very desirable for those solutions which it resists.

The oxide film which forms on aluminum protects the underlying metal from further attack. The speed with which this protective oxide film forms on the metal is remarkable.

Aluminum is used for nitric equipment, chiefly at higher concentrations and at lower temperatures. It vies with copper for the honor of handling acetic acid. The great advantage it possesses over copper is that it can be used in the presence of dissolved oxygen or air while copper is slowly corroded. It is not recommended for acetic acid solutions which contain any appreciable quantities of formic. It is then recommended for purer acetic acid solutions containing dissolved oxygen to any extent and for apparatus which has to be used intermittently.

Since aluminum salts are colorless and non-toxic, the metal can be used for processing substances and materials which would be ruined by slight contamination from other metals and alloys. For this reason aluminum is used for manufacturing many food products, oils, and varnishes. It is often used with the common fruit juices and acids, such as lactic and malic acids.

Presence of sulfates and chlorides is inimical toward the resistance of aluminum to various solutions; consequently nitric or acetic acid containing these anions will generally corrode the metal. Aluminum is not recommended for alkalies because of its amphoteric tendency to combine with them.

Small percentages of copper, silicon, manganese, etc., have been added to aluminum in order to improve its physical properties. As a rule the alloys of aluminum do not show the general resistance of the pure metal. The writer has found exceptional resistance toward all the strong mineral acids by the purer metal.

Copper's Place in Chemical Industry

Copper's service in the chemical industry was, and still is, important. This metal is classed with the noble metals because of its low position in the electrochemical series, although it does not possess the chemical resistance expected from that position. In most corroding media it is slowly corroded in the presence of air or oxidizing agents due to their depolarizing action and the ease with which soluble oxides are formed. It is therefore used in those processes where such action does not predominate.

The pure metal has very little competition in equipment construction designed for the fermentation and alcohol industry. The ease with which it may be fabricated into complicated equipment and its good heat conductivity give it advantages over other metals and alloys. It is used for processing acetic acid and many of the fatty acids in the absence of air. The wood distillation industry employs it for apparatus in conjunction with the distilling and treating of pyroligneous acid and methyl alcohol. It is used in the construction of equipment for turpentine, wood oils, and resin.

Copper is rarely recommended for use with the stronger acids, salts, or alkalies. Ammonia solutions dissolve it readily. It is only slowly attacked by sea water and weak brines.

There are over two thousand alloys of copper containing zinc, tin, aluminum, nickel, silicon, iron, phosphorus, and many other alloying agents. Useless as many of these alloys are for the chemical industry, others are found to be serviceable for many of the common corrosives. The alloys of copper generally possess better physical properties than the pure metal. Uses of these alloys in the chemical industry are too diverse to mention.

The use of lead dates back to the Roman era, when it was used for water piping. Since the advent of sulfuric lead has possessed a unique position among the acid-resisting metals, being one of the few metals capable of resisting sulfuric solutions.

Lead is probably the purest metal used in the chemical industry and because it can be easily and economically produced in such a pure state it finds considerable usage. It possesses physical properties that are both advantageous and disadvantageous; it is soft and malleable, characteristics which permit ease in working but which demonstrate its lack of strength and resistance to shock and impact. If lead is alloyed with 3-10% antimony, called hard lead or regulus metal, most of the physical properties are improved with very little decrease in chemical resistance. Very few other alloys of lead find use in the chemical industry. Recently lead-lined pipe and equipment made of steel have appeared on the market. By this ingenious combination great strength and chemical resistance have been combined. The lead lining in such equipment is from one-eighth to one-quarter inch thick.

Resistance of Lead to Sulfuric Acid

Resistance of lead to sulfuric is due to the formation of an impervious, adherent film of lead sulfate which protects the underlying metal. The presence of sulfuric in some of the lead-dissolving acids, such as hydrochloric, renders the metal much more resistant. Lead is resistant to sulfuric at concentrations below 80% in either hot or cold solutions. At higher concentrations and with oleum, lead shows very little resistance, probably because of the formation of soluble acid sulfate. Lead is also resistant to phosphoric and to hydrofluoric, but strangely enough, not to a mixture of these acids; thus it does not completely resist hot solutions of crude phosphoric acid containing fluorides.

The sulfuric acid industry has been the greatest user of lead equipment. In the lead-chamber process for manufacturing this acid, lead is used extensively.

The production of phosphoric also has necessitated the use of lead in many stages of the wet process. It is chiefly used at the primary stages of the wet process when the phosphate rock and sulfuric are allowed to interact. Lead table tops for laboratories are common installations for school and industrial laboratories. In the electroplating and electrorefining of metals lead is used to a great extent for the lining of electrolytic tanks. Its use in the lead storage cell is common enough.

Nickel may be considered as one of the newest of the metals in the chemical industry. Its excellent physical properties as well as its general chemical resistance place it in an enviable position. Its resistance may be ascribed to the ease with which it builds up protective oxide films in the presence of various corroding media.

Wide as is its use in the chemical industry, one can say that its chief uses are in handling and processing caustic, sodium chloride, and various organic chemicals. When iron or steel is used with strong caustic solutions there is often the danger of caustic embrittlement (another name for intercrystalline corrosion). Nickel is not subject to this type of corrosion under such conditions, consequently it is the more desired in the construction of equipment for handling caustic solutions. The fact that this metal is only slowly corroded by dilute solutions of hydrochloric acid has encouraged its use for the construction of pickling tanks, although Monel metal is preferred. A great deal of this metal is used in conjunction with the digestion, evaporation, and transportation of dyes and their intermediates, essen-

tial oils, and foodstuffs. Nickel is not affected by the phenolic resins; consequently, much nickel equipment is used for these materials. The Edison storage cell makes use of nickel electrodes. The metal is only slowly dissolved by most acids.

The non-ferrous alloys of nickel are as important as the pure metal, if not more so. Most important alloys are divided into 2 classes, the acid-resisting and the heat-resisting alloys. In the former class the most important is Monel metal, containing approximately 67% nickel, 28% copper, and 5% other metals.

Monel metal has probably as extensive usage as any metal or alloy for resisting various corroding media. Its good physical properties and ease of fabrication make it exceedingly attractive for equipment manufacture. Its use is very common in the dye industry, in salt water, brines, and in the manufacture of organic and pharmaceutical chemicals.

As previously mentioned, the alloys of chromium and iron, and nickel, chromium, and iron possess heat-resisting characteristics. In many respects the straight nickel-chromium alloys, and those low in iron such as Nichrome, Chromel, and Q-Alloy possess as good heat resistance but better physical properties at high temperatures. Thus, while a 28% chromium-iron alloy has a tensile strength of 80,000 lb./in.^{2} at room temperature and an 80% nickel-20% chromium alloy 120,000 lb./in.^{2}, the former will have a tensile strength at 1800° F. of only 1500 lb. and the latter 12,000 lb.

Importance of Tin and Lead

To cover the miscellaneous metals and alloys thoroughly would require pages of information and data. Just where one should mention one alloy and leave out another is indeed controversial; however, no paper of this type would be complete without mentioning tin and zinc. Both these metals are used for plating and covering more corrodible metals, and both metals, especially tin, are used directly in the manufacture of many fine chemicals and pharmaceuticals. Tin is often used for water-distillation apparatus. The alloys of these metals with copper and nickel are very common and have found application in many phases of chemical manufacture.

A number of important alloys consist essentially of nickel and chromium with varying quantities of molydenum, tungsten, copper, and iron. The most important of these alloys are the Hastelloys, Illium, the La Bour alloys, Pioneer metal, and Inconel. These alloys have found the widest of uses. Pioneer metal as well as the La Bour alloys has been used in the manufacture of phosphoric. Illium is most commonly known as the metal used for the construction of bomb calorimeters.

Among the rarer metals, silver is the most important. It is used as a lining or in the plated form. Because of its high cost it can only be used in those processes where it is absolutely necessary to prevent contamination or equipment destruction. The photographic chemical industry uses probably more silver than all the other industries combined. Silver is also used in a few installations for the processing of organic acids, dyestuffs, and pharmaceuticals. Tungsten and tantalum possess desirable corrosion-resisting properties and are finding more uses every day.

It can be seen that considerable progress has been made in combating corrosion, "the big bad wolf" of chemical manufacture. A few years ago no metals were satisfactory for handling hydrochloric acid, hot crude phosphoric acid, and hot gases like SO_2 and SO_3. Today these materials are in contact with many different alloys that are not appreciably attacked.

There is very little doubt that newer processes and the production of newer chemicals on a more extensive scale will place extra demands upon the metallurgist for more resistant metallic materials. There is no reason for a pessimistic frame of mind, however, because the possibilities in the alloy field have only been touched and the chemist's knowledge of passivity has been very meager. The march of knowledge and experience goes on toward better metallic materials of construction.*

* Part III of a series appearing in *The Journal of Chemical Education*, March, '36, p. 106. In an earlier issue of CHEMICAL INDUSTRIES, February, '36, p. 158, a digest of Part II of the series was given.

Maintenance and Repairs of Grinding Machinery

By W. A. Stapleton

Maintenance of grinding machinery is of great interest to plant engineers because it is a well-known fact that special steel manufacturers are devoting themselves to the necessary supply of particular alloys which will give the greatest life possible under heavy duty conditions. For instance, it has been found from actual experience that even by using Stellite on manganese steel grinding tips or hammers, the life of the parts has been easily increased 4 times on semi-abrasive materials, but naturally on more abrasive products the life is proportionately lower.

Cost of maintenance and repairs for grinding machinery is now receiving very full investigation by manufacturers installing equipment, so that when arriving at the finished cost per ton all-in of a given material the maintenance and repairs factor is made very clear in order that a complete check can be made in comparison to the initial cost of a certain machine.

A machine should be selected for the full duty it has to perform. For instance, when grinding coke to a fine powder, the cost of maintenance and repairs should be thoroughly investigated to make quite sure of the correct selection of machines and auxiliaries. Slow speed machinery is indicated when treating this class of material in order to arrive at the lowest all-in cost per ton of finished product. For instance, a slow speed ball mill will take approximately 10 h.p. per ton more to grind to a given mesh, than a medium speed roller mill, but the effect of the abrasiveness of this material when being ground on the roller type mill increases the cost of maintenance to such an extent that it out-weighs the extra horsepower required to drive the ball mill.

When considering the ball mill, special selection of grinding media should be made to give the longest life possible. On this type of mill the make-up ball charge can now be inserted while the mill is running; in contra-distinction to this, it is usual to stop the roller type mill in order to replace parts that are worn. Therefore it will be seen that the loss of production should also be added to the full cost of maintenance and repairs.

Incidentally, in many cases where making comparison of cost of repairs, the very important item of labor for carrying out the repairs is entirely left out. It will be readily understood that some machines are much more accessible than others, and the labor cost to take apart and re-assemble should be investigated, as it takes much less time if the mill has been designed to take care of this item. This is cited because on one particular mill a complete door frame is arranged which carries the roll and pendulum, and the door can be thrown open, exposing the roll for effecting a quick repair while the mill is running.

There is also a very interesting point concerning roller mills. It has been found in practice that rolls made of chrome steel will give a longer life than if supplied in chilled iron. This is due to the fact that the chrome roll can be re-buffed, and the maximum life and running efficiency can be obtained from each roll. This, of course, also affects the life of the grinding ring upon which the rolls crush a given material. It is well known that providing the rolls and the ring retain a flat surface, the capacity and fineness remains consistent. It can be well imagined that in the event of the grinding ring and rolls becoming somewhat corrugated the grinding effect drops off, which

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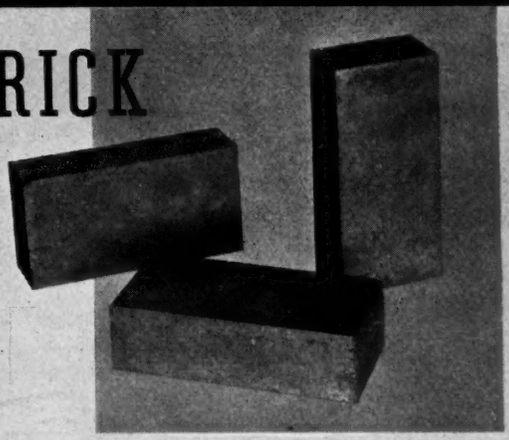

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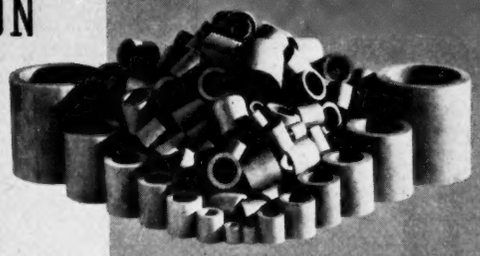

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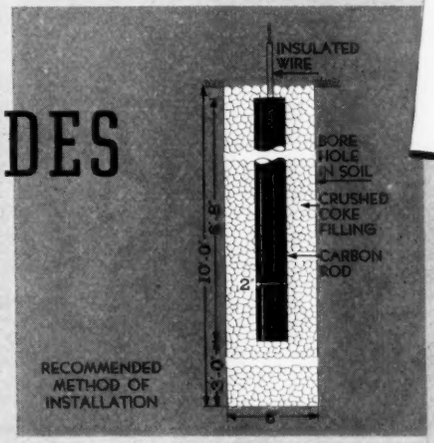

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lowers the capacity when the machine is set for definite fineness. The speed of mill is also very important. Many mills run 10% faster than is actually necessary.

Another important point is lubrication of the running parts fitted to grinding machines. Certain materials when ground create a higher temperature than others. This directly affects the properties of the lubricant used. A very close study has been made in connection with grease and oil lubrication for particular sections of the grinding installation. To-day this subject is receiving attention, because quite a number of milling installations are now running under conditions where hot air is introduced into the milling system for drying the material while it is being ground. Here again, the important question of maintenance comes into the picture, because special attention must be given to the running parts which come into direct contact with hot gases.

The design of a roller mill pendulum must be such that lubricants cannot be allowed to leak through any part of the pendulum arms. This necessitates special precautions as regards the fitting of packing rings of special material, to take care of the expansion and contraction of the oil, as it will readily be seen that when the mill is running under normal conditions, with hot air introduced into the system, a different set of conditions will take place when the mill is shut down and the oil, etc., cools off. Therefore, by paying attention to this particular part, the maintenance costs are kept down to a minimum.

Quite a number of engineers have been satisfied to run their plant until the unit requires a general overhaul. This is a mistake in most cases, because it has been found upon inspection of one part of the grinding media, heavy wear has taken place, and if new parts had been supplied months before, the user would have obtained his maximum capacity for a slight expenditure. When investigating the all-in cost per ton, it will pay to study the complete maintenance and repair costs by selecting, in the initial stages, the most suitable machine for the duty required, whether it be slow speed, medium speed or high speed mills. This depends entirely upon the characteristics of the material to be treated. It is false economy to install a machine because it is cheap in 1st cost, and users can take full advantage of manufacturers of milling equipment who have had well over half-a-century of milling experience. Selection of equipment using air separation in closed circuit has been preferable to an open circuit grinding machine which has the effect of creating dust. A dusty machine causes wear on bearings, belts and adjacent machinery, which, of course, must also be taken into account when considering the maintenance, apart from having the grinding room with a healthy atmosphere for the operatives. One of the most recent developments has been in connection with disintegrators. These machines can now be obtained linked up with air separation in a closed circuit, with the fan arranged in such a manner as to bring the material from the grinder into the cyclone under suction. This relieves the fan blade wear and at once brings down the costs of maintenance. *The Chemical Age*, Feb. 15, '36, p143.

Hygiene and Accident Prevention in Chemical Plants

Hygiene and accident prevention work at the huge British dye plant of Scottish Dyes, Ltd., Grangemouth, Scotland, is reported on by Dr. W. G. Hiscock. The I. C. I. factory at Grangemouth is entrusted with the manufacture of various dyestuffs based on the anthraquinone molecule and used in dyeing and printing cotton, wool, viscose, and acetate silk. Principles involved are similar to general dyestuff manufacture, in that the final dyestuff molecule is built up through a chain of processes involving the preparation of series of intermediates; problem involves the preparation of 137 intermediates, 99 parent dyestuffs, and 900 brands.

Each process involves use of such chemical equipment as agitated pans, vats, stills, filtering equipment of various types, agitated high-pressure autoclaves, and so on. The processes are grouped together in sheds, which are fitted with shafting, a multitude of pipe lines carrying steam, compressed air, vacuum, hot oil, acids, solvents, and so on. In addition, there are, of course, cables carrying electric power for lighting, and isolated power units.

In general, the reactions which are carried out involve chemicals dangerous to the human system; their danger from toxicity or other reasons varying in degree only. In some reactions high temperatures are necessary; in others noxious gases or vapors are produced; while in others the reactants are corrosive. Under normal conditions the safeguarding of life and limb would be no light task, but when the chemicals involved are considered it will be seen that the task is a difficult one.

Table gives a list of the chemicals which have been scheduled at Grangemouth Works for particular attention. Some are known to attack the human frame in some way or another, while no chances are taken with the others.

Solids	*Liquids*	*Gases*
Aluminum trichloride	Acetic acid and acetic anhydride	Acetylene
Calcium chloride	Aniline and other amino compounds of benzene and toluene	Ammonia
Calcium hypochlorite (bleaching powder)	Antimony pentachloride	Carbon dioxide
Caustic soda and potash	Benzol	Carbon monoxide
Chlorates	Benzoyl chloride	Chlorine
Drikold	Bromine	Formaldehyde
Iodine	Chlorbenzene	Methylamine
Lead and its compounds	Dimethyl sulfate	Oxides of nitrogen
Lime	Ethanol	Phosgene
Mercuric oxide	Ethanolamine	Pyridine
Naphthalene	Mercury	Seleniuretted hydrogen
β-Naphthylamine	Methanol and butanol	Sulfur dioxide
Phenol	Mineral acids	Sulfuretted hydrogen
p-Phenylene diamine	Mineral oils	
Phthalic anhydride	Nitro compounds of benzene and toluene	
Sodium	Para-chlor-phenol and ortho-chlor-phenol	
Sodium and potassium dichromate	Petrol	
Sodium hypochlorite	Sodium hypochlorite and calcium hypochlorite solutions	
Sodium phenate	Sodium hydro-sulfite	
Sodium sulfide	Sulfuryl chloride	
p-Toluene-methyl-sulfonate	Tar	
p-Toluene-sulfon-chloride	Toluol	
p-Toluidine		
Compounds of vanadium		

Author gives in considerable detail description of methods employed in the medical service, choice of worker, instructions to workman, examination of materials used or produced, methods of handling acids, operating instructions on various equipment, lighting, plant cleanliness, fire hazards, etc. *Chemistry & Industry*, Mar. 20, p222.

Industrial Chemicals

Increasing Yield of Acetic Anhydride

In the catalytic splitting of acetic acid into acetic anhydride with solid or liquid metal phosphate catalysts, the reaction is facilitated by the presence of volatile nitrogen compounds such as pyridine, acetamide, ammonia, or acetonitrile, which all favor this reaction. It has now been found by the Consortium für Elektrochemische Industrie G.m.b.H., of Munich (E. P. 441,956 of 1934) that the increase in the yield of anhydride is not limited to the use of metal phosphate catalysts. Yield of anhydride can be greatly increased, it is claimed, by using as catalysts small amounts of volatile phosphorus-containing substances ex-

cluding, however, phosphoric acid, in the presence of small amounts of volatile basic or base yielding nitrogen compounds. Unexpected and technically important effect of this combination of volatile phosphorus-containing substances and nitrogen bases occurs not only if the nitrogen compounds are present in the reaction zone itself, but also if they are mixed with the vapors after the latter have traversed the reaction zone. In consequence, an improved effect can be obtained by introducing into the reaction mixture, before or after it has passed through the hot reaction space, small amounts of volatile basic or base-yielding nitrogen compounds and by cooling the reaction mixture in presence of such nitrogen compounds.

In one of the examples given in the specification, through a vertical, empty, electrically-heated carbon vessel, surrounded by an iron mantle and of 50 mm. internal diameter and 500 mm. high which had over the larger part of its length a temperature of 600-670° C., were passed from below upwards, 600 g. of acetic acid vapor per hr., containing 0.3% of triethyl phosphate vapor and 0.3% pyridine. Vapors were condensed in an attached condenser. Condensate contained 72% anhydride. If the process was operated in a similar manner without, however, addition of pyridine, there was obtained only about 40% by weight of anhydride in the condensate.

Advantages of the use of gaseous catalysts in combination with nitrogen-containing bases, over the known use of phosphate containing solid or liquid catalysts in combination with these bases are claimed as follows: Obstructions such as occur with solid catalysts, particularly when soot has been deposited in the narrow intermediate space, are avoided, also pulverization of the catalyst and spraying if liquid catalysts are employed. Question of the stability of the catalyst disappears because of the very small amounts of gaseous catalysts used. Difficulties which the question of the material for the apparatus offers in the use of molten phosphate catalysts disappear. Moreover, it has been found that the conversion to anhydride on the use of gaseous catalysts is higher, for example, than by use of the usual melts. If, for instance, in the carbon vessel of the example a melt consisting of equimolecular amounts of sodium and lithium metaphosphates is used, so that the height of the melt is 100 mm. and 600 gms. of acetic acid with the addition of 0.3% of pyridine is led through at a temperature of 700° C. there is obtained only 66.3% of anhydride. About the same result was thus obtained as in example 1 with an increased temperature. At a melt temperature of 660° C. the yield of anhydride fell to 40.8%. *Chemical Trade Journal*, Mar. 20, p240.

Carbon Black from Natural Gas

In a new Canadian Carbon black from natural gases process developed in Canada, use is made of a porous refractory tube through which inert gas is allowed to pass to prevent the deposition of carbon on the inner walls of the tube. Yields of 65 lb. per thousand cubic ft. have been obtained from 70 to 30 propane-butane mixtures, and 19 lb. from methane. Carbon black produced by this process has a high density, low sorptive power, accelerates the cure in a rubber stock, and gives similar resistance to aging and abrasion that is obtained by using "soft" blacks. On the other hand, it imparts greater stiffness to a rubber stock, and appears to occupy a place between the channel and the "soft" blacks.

Direct Process for Magnesium Compounds

Magnesium compounds are usually obtained from dolomite by treating the calcined mineral with magnesium chloride to form magnesium hydroxide, and, after separation from the resulting calcium chloride liquor, working up the hydroxide. A serious drawback to this process is that the hydroxide is precipitated in a form difficult to filter and to wash. A process controlled by the I.G., aims at overcoming the foregoing difficulties by directing the reaction between dolomite or limestone with magnesium chloride liquor to recovering the magnesia in the form of anhydrous neutral magnesium carbonate, which crystallizes in the form of well-defined small grains and can be separated without difficulty. *Chemical Trade Journal*, Mar. 27, p261.

Caustic Soda or Potash Without Fusion

Production of anhydrous, crystalline caustic soda or caustic potash without fusion is announced by Autoxygen, Inc., N. Y. City. A continuous batch process is employed in which caustic soda solution and a hydrocarbon oil are subjected to partial pressure distillation. Operation is rapid, and the size of caustic solution droplets stirred into the oil controls the size of crystals produced. Thus, for the first time, anhydrous caustic soda is produced without fusion, and free from contamination by chloride or carbonate salts, since solubilities of these impurities is much less than the caustic.

Product is free-flowing, crystalline, and in some cases retains small amounts of oil, thus enabling the workman to handle the caustic without fear of burns from handling or dust. Solubility exceeds that of fused caustic, and the time required for production per batch is much less than the time required to produce fused caustic. Product finds advantages over fused where hazards are great and where exceptional purity of product is required.

Recovering Sulfuric Acid as By-Product

A new process which offers the possibility of treating, in a simple manner, sulfuretted hydrogen or sulfur with a view to obtaining sulfuric acid has been worked out by Dr. Wolfhart Siecke, of the chemical laboratory of the Metallgesellschaft A.-G., Frankfort-on-Main. Apart from special cases in the manufacture of lithopone and permanent white, the new process can successfully be applied in the distillation of pit coal, carbonization of lignite, hydrogenation of sulfur containing tars and tarry oils and in the industry dealing with natural gases, where hydrogen sulfide is obtained as a by-product.

The new process comprises 3 stages. The sulfuretted hydrogen is burnt in an excess of air: $H_2S + 3O = SO_2 + H_2O$. The combustion gases, without having undergone any preliminary treatment, are passed over a catalyst, where the SO_2 is oxidized into SO_3 without being affected by the aqueous vapors present: $SO_2 + O + H_2O = SO_3 + H_2O$. The reaction gases enter a condenser, where the gaseous sulfuric acid is submitted to a fractional condensation: $SO_3 + H_2O = H_2SO_4$. Considered as a whole these 3 stages are expressed by the formula: $H_2S + 4O = H_2SO_4$. The catalysis as well as the condensation present entirely novel features in their technical operation. *Metallgesellschaft Periodic Review*, February.

Plant Operation

Improvement in Tar-Distillation Stills

Improvement in design of tar-distillation stills is claimed according to a recent patent (E.P. 441,435 of 1935), granted to Yorkshire Tar Distillers, Ltd. The peripheral edge of the domed bottom of a tar-distillation still is secured to the lower edge of the still wall by welding in the acute angle annular channel afforded between said edges or parts of the inside of the still.

Preferably, according to the invention, the rim of the dome-shaped bottom is provided with a narrow flat lip outward from the center of the bottom and at right angles to the plane of the still wall, or alternatively the rim of the bottom is not provided with a lip but with the lower edge of the still wall chamfered at an angle to suit the curvature of the bottom dome, so that in either case an attachment is effected by welding along the line of contact between the lower edge of the still wall and the upper face of the lip or the outer rim of the still bottom.

It is claimed that this method of construction, illustrated diagrammatically in the specification, will simplify manufacture.

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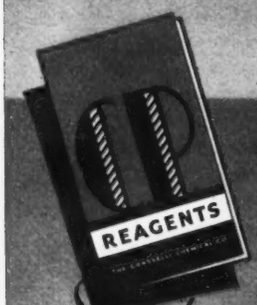

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REAGENTS

Fertilizers

Cyanamid Without Calcium Carbide Step

Elimination of the calcium carbide step in the manufacture of cyanamid is reported by Russian chemists By treating lime, or better still calcium carbonate, with ammonia, carbon monoxide and nitrogen, it is possible to obtain a cyanamid containing 26.8% of nitrogen in the 1st case and 28.0% in the 2nd. When working with the carbonate, the most suitable temperature has been found to be 800° to 850° C. Quantity of ammonia should be 6 times the theoretical, while the quantity of carbon monoxide should be 3 times that of the ammonia. Proportion of nitrogen should be about 60% of the gaseous mixture. In these conditions the dissociation of the ammonia is about 3.4% of the quantity employed. Production costs for cyanamid by this method are stated to be nearly 24% lower than the production costs by the usual carbide method. Postniknow, Kounine & Ieremeieva, *Journal Khim. Prom*, '35, 12, p795-802.

Plant Operation

Proper Procedure for Handling Caustic Valves

Goggles, a pair of long gloves, and a convenient water line, saved the eyesight, and prevented serious burns, of a Westinghouse worker engaged in the care of caustic potash in a hydrogen drier.

A safe way to handle a clogged valve when caustic solutions are present.

An employee in the Wire Products Division of Westinghouse Lamp, Bloomfield, N. J., while attempting to drain water from a hydrogen drier, experienced some difficulty in opening the petcock. Apparently the temperature of the saturated solution of the caustic potash had dropped so low that it partially solidified and choked the outlet of the drier.

On the 3rd attempt to release it, pressure from leakage in the valve suddenly forced out the plug and splashed caustic solution over the employee's face and arms. His goggles protected his eyes; long gloves protected his arms and hands, and the fact that he was using a 2-ft. wrench kept him a reasonably safe distance away. A nearby water line, used to facilitate the work and also to afford a ready supply of water in event of an accident from caustic spray, enabled the worker to apply water immediately, thereby minimizing the seriousness of the burns on the exposed parts of his face and arms.

The safety precautions established for this work have proved their worth in this one instance alone, especially since the employee's sight was saved and serious burns prevented. Also, they prevented a compensation loss of $15.00 per week for life of this employee who was 31 years of age. As a result of the accident, however, even more rigid precautions have been established. A newly designed valve and plug on the drier and the use of a face and head mask for this operation will afford even better protection in the future.

The Literature

Articles of interest to the chemical and process industries particularly noted in a monthly review of the U. S. and foreign periodicals.

Bulk Packaging. "Bracing Cooperage Shipments," by William H. Herring. Discussion of the flat steel band method of bracing cooperage carload shipments. *The Wooden Barrel*, March, p14.

Dry Ice. "A New System for Production of Dry Ice," by Dr. Ing. G. Maiuri. Equipment for the Maiuri process is briefly outlined, flow sheets clearly trace the method of production, and a brief discussion outlines the thermodynamic principles involved in the process. *The Dry Ice Journal*, (German), March, p99.

Enameling. "Mechanics of Color Matching," by P. B. Smith. Practical discussion of general principles. *The American Enameler*, published by Porcelain Enamel & Mfg., Baltimore, March, p3.

Enameling. "An Elementary Course in Enameling," by F. R. Porter. A series of "notes" summarizing a course on porcelain enameling processes presented to 70 skilled enamel workmen in the Chicago area. An excellent outline for study. *Ceramic Industry*, April, p284.

Gums. "Production of Clean Gum Rosin," by W. C. Smith. Article lists 3 methods of removing dirt from gum rosin, namely: 1. removal of dirt directly; 2. production of pure raw material; 3. removal of foreign matter from commercial gum before distillation. *Ind. & Eng. Chem.*, April, p408.

Industrial Chemicals. "Magnesium Compounds from Ocean Water," by H. Henry Chesny. Answers many questions relating to the economic feasibility of this magnesium salt recovery process. *Ind. & Eng. Chem.*, April, p383.

Liquid Chlorine. "The Handling and Use of Liquid Chlorine," by F. Holt. Common containers for liquid chlorine are listed and an exceptionally complete listing of British regulations covering design and transport of these containers is included. *Chemistry & Industry*, March 27, p245.

Oils. "Polymerization of Drying Oils—Some Current Theories." Drying properties of paint films are studied from the standpoint of the oil's polymerization properties. *The Chemical Age*, March 21, p253.

Packaging. "Packages Help Make Products," by I. Willard Crull. A fine working plan for any manufacturer planning to redesign his product's package. Crull tells exactly how his company went about redesigning its package. *Metropolitan Life Insurance Executives Service Bulletin*, April, p5.

Paint. "Paint in the Petroleum Industry—A Survey of the Many Problems Arising in Its Utilization," by H. B. Footner. The part played by paint in meeting corrosion problems of the petroleum industry is thoroughly and practically outlined. *The Petroleum Times*, March 28, p399.

Paper. "The Fastness to Light of Coloured Papers." Summary of reports of the various committees appointed by the Technical Section, Papermakers' Association (British), to recommend a standard method of determining colored papers' fastness to light. *The Paper-Maker & British Paper Trade Journal, Supplement*, April, p54TS.

Paper. "The Forest and The Paper Industry," by Austin Cary. An economic study relating the paper industry with its dependence upon raw material. *The Paper Industry*, April, p30.

Petroleum. "Chemical Processes in Refining of Petroleum Distillates," by Jacque C. Morrell and Gustav Egloff. These 2 outstanding men in the field of petroleum refining research discuss chemical refining methods, what is accomplished, and the cautions which must be observed in use. *The Oil & Gas Journal*, March 26, p57.

Plastics. "Industry and the Soy Bean," by E. F. Lougee. The first complete story of Ford Motor's experimental development of soy bean plastics. *Modern Plastics*, April, p13.

Plastics. "Synthetic Plastics—Commercial Progress and New Fields of Application." A summary of progress, written for the rubber manufacturers who supply raw materials to plastics producers. *India Rubber World*, April 1, p37.

Rayon. "The Use of Corn Sugar in Viscose Rayon Manufacture," by H. B. Vollrath. A critical examination of the background and functions of glucose use in synthetic yarns production. *Rayon & Melliand Textile Monthly*, April, p70 (244).

Research. "Getting the Most Out of Research," by D. H. Killeffer. Beyond the startling discoveries of our research institutions lies the publicity necessary to make their work known to the average man. Killeffer explains how this should be done, and the value of doing it. *Ind. & Eng. Chem., News Edition*, April 10, p121.

Research. "Research—Progress Insurance," by Dr. C. M. A. Stine. An oft-repeated theme is again intelligently summarized, this time by a prominent du Pont official. Brief notes on the development of Cellophane and Duprene are worthy of careful reading. *Manufacturers Record*, April, p35.

Rubber. "Some Properties of Chlorinated Rubber-Resistance to Action of Acids and Alkalies." This brief discussion includes remarks on composition, various grades of viscosity, tensile strength, chemical properties, and cost comparison of chlorinated rubber use as against other packaging materials. *The Chemical Age*, March 28, p289.

Sales Display. "Check List for Window Display," by N. J. Leigh. Subtitled "Fifty questions for advertisers to consider before engaging in a point-of-sales campaign." Article is divided into Plan, Design, Manufacture and Distribution. An excellent check list for any advertising manager. *Printers' Ink Monthly*, April, p48.

Shellac. "Nature and Constitution of Shellac, XI—Rates of Adsorption of Moisture by Shellac Films," by William Howlett Gardner and William Kappenberg. One of a series of articles making an extended study of shellac film structure, this article deals with adsorption, factor which contributes to whitening or bloom on shellac films. *Ind. & Eng. Chem.*, April, p437.

Synthetic Rubber. "Economics of Synthetic Rubber," by E. R. Bridgwater. One of du Pont's rubber researchers writes a defense of Duprene's commercial soundness, basing his remarks on the national desire for self-sufficiency. *Ind. & Eng. Chem.*, April, p394.

Synthetic Rubber. "Development of 'Buna'—Germany's Synthetic Rubber," by Alfred Salmony. I. G.'s statement that it has solved the synthetic rubber problem comes as an announcement of international importance. Interesting when compared with our domestic attempts at rubber independence. *The Rubber Age*, April, p27.

Textiles. "Uses of Phosphates in the Woolen and Worsted Industries. Value of Sodium Metaphosphate," by F. Hall. Brief analysis of how phosphates are used to meet textile wet process problems. *Textile Colorist*, p262.

Waterproofing. "Some Recent Developments in Waterproofing," by C. H. S. Tupholme. Up-to-the-minute news from the relatively new field of textile development. *American Dyestuff Reporter*, April 6, p167.

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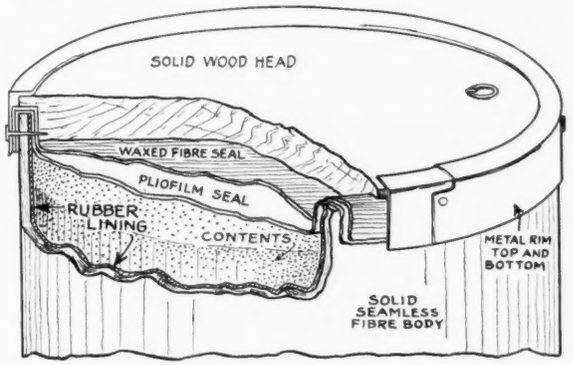
Bulk Packaging, Handling, Shipping

Carpenter Container, Brooklyn, has introduced a line of latex coated fiber drums. Made with a solid seamless fiber body, the inner wall of these drums is coated with a vulcanized latex composition, the drums then being rotated to spread the coating uniformly over the treated surface. The latex composition seeps



Cut-away section showing protective seals of drum.

into the crevices around the bottom of the container, to form a seamless coating which makes the container air-tight and leak-proof. Coating, due to its composition, adheres firmly to the bottom and wall of the drum and may be stripped off only with difficulty.

According to Henry Craemer, sales manager, the new latex coated fiber drums are suitable for solids and semi-liquid materials, although the technical department conducts extensive tests on each type of material intended for shipment in them.

John P. "Pat" Moran is the new Chicago sales manager for Wilson & Bennett Mfg. Co., one of the leading manufacturers of steel pails, drums and barrels, with factories and offices in Chicago, Jersey City and New Orleans. He has been associated with the company for 9 years and is thoroughly experienced in the steel container business and the requirements of shippers. Mr. Moran will also assist in directing sales activities in some other territories, and his services and advice are available to all shippers.

Truckmen Plead Against Pickup Service

The Merchant Truckman's Bureau of N. Y. has asked the I. C. C. to deny the petition of certain Eastern roads to institute pickup and delivery service without alternative allowances to shippers pending an investigation now underway by the I. C. C.

Welded Tank Cars

I. C. C. has granted permission to Union Tank Car, du Pont, and Phillips Petroleum for construction and test operation of fusion-welded tankcars for use in transporting certain dangerous chemicals.

In an earlier report, the commission had denied Union Tank Car authority for experimental use of fusion-welded tankcars in transporting liquefied petroleum gas.

Having reconsidered an earlier decision in which it refused du Pont this same permission, commission has now granted to the company authority to construct and operate in experimental service one electric-arc-fusion-welded tankcar of the ICC-103-C specification type to be used in the transportation of nitric acid. Car is to be used only between Eastern plants of the company, and on specified lines.

In its petition, the du Pont company told the commission that, while there have been no accidents from the use of cars now authorized for transportation of nitric acid, there has been much trouble with them in the way of leaks caused by riveting and caulking, and that this trouble would be avoided in cars made by the electric-fusion welding process.

The commission granted to Phillips Petroleum authority for construction of not more than 25 tankcars. These cars are to be used in service tests for transportation of petroleum products, the report states.

Miscellaneous Booklets

The American Association of Petroleum Geologists, Tulsa, Okla. "Natural Gas," by Henry A. Ley, reprinted from "Geology of Natural Gas." Though not a comprehensive treatment of the natural gas industry, this distinguished summary should be valuable to the process industries.

The American Association of Petroleum Geologists. "Geology of Natural Gas," edited by Henry A. Ley. The most important known occurrences of natural gas in North America, methods of estimating reserves, and a resume of the industry's history are included in this fine collection of papers by prominent gas technologists. $6.00, Association members $4.50 .

American Petroleum Institute, N. Y. City. "Petroleum Drilling and Production." Methods and equipment used in drilling and producing oil. 5c.

American Society for Testing Materials, Philadelphia. "Symposium on Paint and Paint Materials." Taken from the Philadelphia Regional meeting of March 6. Excellent statement of present-day problems in the paint industry.

Dept. of Commerce, Washington. Exporters Handbooks, for preparing shipments to Europe, Canada or Cuba, have been issued by Bureau of Foreign & Domestic Commerce. Proper use may save exporters needless difficulties and losses in their shipments.

Dept. of the Interior, Washington. "Methane-Indicating Detectors Prove Dependable in Sampling Air in Anthracite Mines," by R. D. Currie. I. C. 6874.

Dept. of the Interior. New Monograph, Bureau of Mines, gives back-pressure data on natural gas wells, showing application of this data to production problems. Obtainable from American Gas Association, 420 Lexington ave., N. Y. City, $1.50.

Dept. of the Interior. "Anhydrous Sodium Sulfate from Saline Deposits or Brines by a 4-Stage Process," by J. E. Conley and Everett P. Partridge. R. I. 3299.

Dept. of the Interior, Bureau of Mines. "Trends in White-Pigment Consumption," by Paul M. Tyler. Discussion of the demand for paint, and a brief review of the growth in titanium pigment use are included in this circular. I. C. 6881.

Dept. of the Interior, Bureau of Mines. "Alums and Aluminum Sulphate," by John B. Umhau. Uses, production methods, statistics on domestic production, tariffs, markets and producers, make this a fine survey of the field. I. C. 6882.

H. M. F. Faure & Co., Cunard House, Leadenhall st., London, England, E. C. 3. "Review of the Oil & Fat Markets—1935."

Illinois State Geological Survey, Urbana. Bulletin No. 63, "The Competitive Position of Illinois Coal in the Illinois Coal Market Area." by Walter H. Voskuil. Charts and tables showing coal distribution and consumption in the Great Lakes Area, and freight rates to and from points within this area, make this booklet a fine market study of the mid-west.

The Institute of Metals, 36 Victoria St., Westminster, London, England. "The Transformation in the Copper-Gold Alloy Cu_3Au," by C. Sykes and H. Evans. Notes on experiments conducted on the solid transformations of this type alloy.

The Institute of Metals. "Plastic Deformation and Age-Hardening of Duraluminum," by Major P. L. Teed. Notes on experiments with heat treatment of Duraluminum.

The Institute of Metals. "Metallic Wear," by H. W. Brownsdon. Experimental methods for determining wear of metals caused by friction are outlined and discussed.

The Institute of Metals. "A Deep-Drawing Test for Aluminum," by A. G. C. Gwyer and P. C. Varley. A recently developed test for aluminum of commercial purity.

The Institute of Metals. "The Constitution of the Tin-Rich Antimony-Tin Alloys," by D. Hanson and W. T. Pell-Walpole. An investigation using thermal analysis, microscopical examination and measurement of electrical resistivity.

International Tin Research & Development Council, 149 Broadway, N. Y. City. "The Corrosion of Tinplate," by T. P. Hoar. Tinplated surfaces are not completely impermeable, and Hoar gives a thorough analysis of cautions required for tinplated equipment use. Series A, No. 30.

International Tin Research & Development Council. "Research on Thin Layers of Tin and Other Metals—I. The Influence of Thin Metal Layers on the Deterioration of Technical Insulating Oils," by P. J. Haringhuizen and D. A. Was. Series A, No. 29.

N. J. State Social Security Commission, Trenton. This majority report to the N. J. Legislature by the Social Security Commission becomes doubly interesting to the chemical manufacturer by the presence of Harry L. Derby, Cyanamid president, as chairman. The problems discussed and resolutions presented in the report form an ideal basis for studying this current industrial problem, and should be welcomed by the industry.

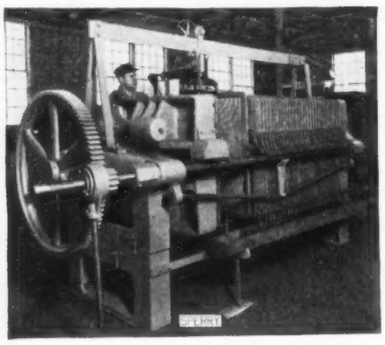
Social Security Board, Washington, D. C. The board has just issued a chart summarizing unemployment compensation laws existing in 12 states which should be of value to the manufacturer faced with similar actual or potential legislation.

University of Florida Agricultural Experiment Station, Gainesville. Bulletin 292, "The Use of Zinc Sulphate Under Corn and Other Field Crops," by R. M. Barnette, J. P. Camp, J. D. Warner and O. E. Gall.

New Equipment

Corrosion-Proof Filter Press Plates QC 352

An important cost-reducing development is reported by one of the large filter press manufacturers of especial benefit to soap manufacturers and others whose process includes the filtration of soap lye. It is a well-known fact that filtration of soap lye and other corrosive media has been a more expensive operation because of the destructive effect of these substances on the plates of the filter presses. Life of the cast iron plates commonly used in these presses is comparatively short. The powerful solutions to which they are subjected renders them useless after a few months' service. Naturally this means costly replacements, time out to rehabilitate the presses and the consequent interruptions and delays to production schedules. Engineers of the company have developed a special form of Ni-Resist metal from which to cast the filter press plates. These special plates are reported to have been remarkably successful in resisting the attacks of these powerful corrosive media. Definite tests have been made by installing these Ni-Resist plates in the same presses with ordinary cast iron plates. Pictured is a large filter press equipped with these special Ni-Resist plates. It is also equipped with the new Plate Shifting Device which makes it possible for one man to lift and shift even 500 lb. plates with comparatively little effort and which was reported on in this department in the December issue, '35, p576.

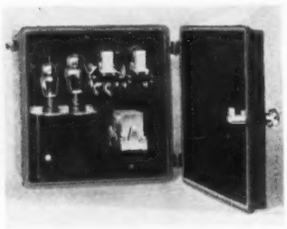


Surface and Needle Pyrometers QC 353

A new set of combination surface and needle pyrometers which is unique and which will find universal application in many industries like die casting, plastic molding, rubber processing, paper, textile, electrical, metallurgical, chemical, glass, pottery and many other industries is available. By merely interchanging the various types of thermocouples, a matter of a few seconds, the instrument is transformed into 4 different types of surface and needle pyrometer.

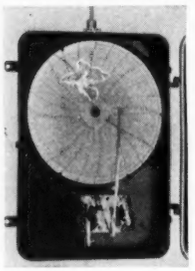
New Line of Safeguard Equipment QC 354

A new and materially improved line of combustion safeguard equipment has just been placed on the market. This apparatus includes 2 separate and distinct types of relays, and a flame sensitive electrode which can also be used as a special spark plug for electric ignition. Any of the standard line of primary controllers and motor valves are used to complete the system of combustion safeguard. The relays contain the thermionic tubes for rectification and amplification of the power input which, when conducted from the electrode unit to ground through the flame, operate the relay units controlling the operation sequence, main fuel valve, etc. Obviously any interruption in the circuit to ground through the flame (flame failure) causes instantaneous and positive shut-down.



Gas Filled Recording Thermometer QC 355

An accurate gas-filled recording thermometer, having a small temperature-sensitive bulb for long lengths of connecting tubing, has for many years been the dream of every instrument engineer. Such a thermometer has at last been successfully developed. It is offered for measuring temperatures between —60° F. and 1000° F., where tubing lengths as long as 100 feet and even longer under certain conditions, are required by the application. Instrument is particularly noteworthy because of its simplicity and extreme degree of accuracy.



Centrifugal Machine at du Pont Experiment Sta.*

A new centrifugal machine, operating on the same basic principle as the old-fashioned cream separator, but so powerful that molecules and sub-microscopic particles can be forced to settle in their solutions, has been installed in the du Pont Experimental Station, Wilmington.

At the normal operating speed of 60,000 revolutions a minute, the rotor of the du Pont machine turns over about 15 times as fast as the crankshaft of an automobile engine running at top speed, and a centrifugal force of 250,000 times gravity is produced. Under such conditions, a mass of one pound would weigh 125 tons. In operating this machine, nearly an hour is required to attain normal speed, and the same time is required to come to rest. Also, at normal speed, the rotor has a peripheral velocity, or tip speed, of more than 20 miles per minute, which is approximately one and one-half times the muzzle velocity of an ordinary 22-caliber rifle bullet. This tremendous speed of rotation is produced by oil-driven turbines integral with the rotor shaft.

In operating the ultracentrifuge, the liquid material to be studied is placed in a small cell inserted in the rotor. This cell has transparent quartz windows, and in the massive steel chamber which encloses the rotor are corresponding windows or peep-holes. By directing a beam of light through the windows, the observer can note the effects of the centrifugal force.

"Just what scientific advances will be achieved with the ultracentrifuge in the years to come is impossible to predict accurately," reports Dr. E. O. Kraemer, du Pont research chemist. "But we do know that the pioneer work of Svedberg, Nichols, and their collaborators has provided a new tool having exciting potentialities in the field of colloid chemistry, which field includes the chemistry of giant molecules, of which such commercially important substances as cellulose, glue, resins, rubber, and starch are but a few examples."

New Duplex Hose QC 356

A type of rubber tubing, or hose, of radically new construction has just been placed on the market. It is especially designed for welding equipment and similar service. Twin hose are simultaneously molded with a connecting web between them.

* Photograph of the machine appears in the "Roto" Section this issue.

Chemical Industries,
25 Spruce St., N. Y. City.

I would like to receive more detailed information on the following equipment: (Kindly check those desired.)

QC 352 QC 355
" 353 " 356
" 354

Name .....

Title ..... Company .....

Address .....

COLUMBIA

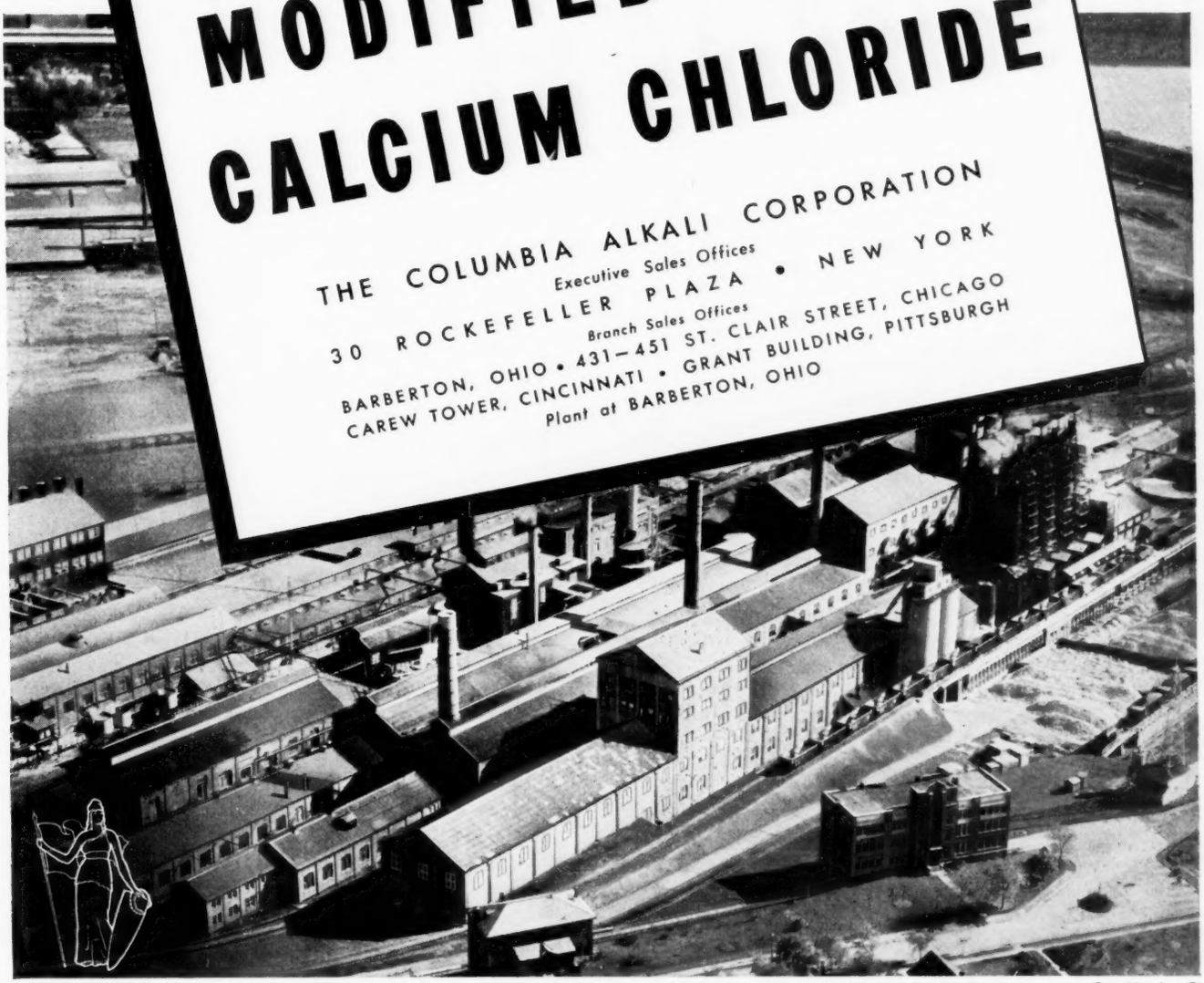
SODA ASH
CAUSTIC SODA
MODIFIED SODAS
CALCIUM CHLORIDE

THE COLUMBIA ALKALI CORPORATION

Executive Sales Offices
30 ROCKEFELLER PLAZA • NEW YORK

Branch Sales Offices
BARBERTON, OHIO • 431–451 ST. CLAIR STREET, CHICAGO
CAREW TOWER, CINCINNATI • GRANT BUILDING, PITTSBURGH

Plant at BARBERTON, OHIO



AERIAL VIEW OF PLANT – AT BARBERTON, OHIO

Booklets & Catalogs

Chemicals

A752. American Distilling, N. Y. City. At last a prominent industrial alcohol producer has wisely given to its customers and to industry at large a fine, complete summary of official alcohol data. Regulations, formulas, definitions and innumerable facts of wide value are collected for the several different industrially used grades of alcohol. Booklet itself is in loose-leaf form, and is provided with a number of blank pages where the user may add future changes in local alcohol regulations.

A753. J. T. Baker Chemical, Phillipsburg, N. J. April *The Chemist Analyst* contains 6 articles of both interest and value for the control chemist. Seven pages of laboratory suggestions from various analysts throughout the country will provide several time savers for the lab man.

A754. Commercial Solvents. April *Alcohol Talks* is titled "Toxins, Science and Alcohol," telling the vivid and victim-strewn story of poison through the ages, and of alcohol's part in our present methods of detecting traces of poisons after death.

A755. du Pont. *The Du Pont Magazine,* April, gives vivid picturization of chemistry's role in the nation's industry. Page listing new products of this and other firms is of particular interest. An excellent article on scientific horticulture is on pages 6 and 7.

A756. Eastman Kodak. April *Synthetic Organic Chemicals* tells how organic chemicals stimulate plant growth.

A757. Frank Fehr & Co., London, England. "Annual Review of the Oilseed, Oil and Oil Cake Markets for 1935." An extremely complete survey, of inestimable value to anyone in the industry.

A758. Givaudan-Delawanna. March *Givaudanian,* news notes from and for deodorant and cosmetic industries.

A759. Givaudan-Delawanna, Industrial Aromatics Division. March *Givaudanian* discusses the difficulties overcome in finding deodorants for latex. Five products have been evolved which do not cause discoloration, coagulation or precipitation.

A760. Hercules Powder. *The Hercules Mixer* for March, containing Hercules news items gathered from every section of the country, is one of the most attractive of company magazines. Of particular interest this month is the brief discussion of how this company sells its naval stores.

A761. O. Hommel Co., Pittsburgh. April *Ceramic Forum* concludes the article on "Furnaces for the Vitreous Enameling Industry."

A762. Merck. April, *The Merck Report,* more distinguished articles on advances in medical and pharmaceutical chemistry. A synopsis of important changes in the *U. S. Pharmacopoeia,* XI, is particularly noted.

A763. Metasap Chemical, Harrison, N. J. "Metallic Soaps, Their Uses and Properties." Subtitled "Of special interest to research men," the material is not too technical for general consumption; should be of particularly great interest to paint, textile, leather, cosmetic and specialty industries.

A764. National Oil Products, Harrison, N. J. "Interpretation of Analysis for the Layman," attractive 40-page booklet, explains clearly and in well-organized form the principles and terms involved and used in oil analysis. Section explaining what each term used in the booklet means is extremely valuable for anyone coming in contact with sulfonated or fatty oils.

A765. Philadelphia Quartz. April *Silicate P's & Q's* tells of silicate use in manufacture of adhesives for the paper industry.

A766. Photo Crafts Laboratory, Wantagh, L. I., N. Y. "Vere Best Photographic Chemicals" for fine grain processing are listed in detail. List includes practically every needed photographic chemical.

A767. Sergeant Pulp & Chemical, N. Y. City. Spring '36 list of Sergeant chemicals. Grades and containers for each product are listed.

Monthly Price Lists

A768. Mallinckrodt. April Price List.
A769. Merck. April Price List.

Equipment

A770. Aluminum Co. of America. March *Aluminum News Letter,* news of developments in aluminum industries.

A771. Babcock & Wilcox, N. Y. City. "Insulating Firebrick." Complete information of 5 types is listed in Bulletin R-2-D. List of applications is particularly valuable.

A772. Babcock & Wilcox. Refractory mortars and plastics, developed to meet industrial furnace conditions. Characteristics and possible uses are listed.

A773. Babcock & Wilcox. "Seven Facts About Boiler Tubes," new 16-page Bulletin T-14.

A774. Babcock & Wilcox. Integral-furnace boilers of wide variety are discussed and vividly pictured in 24-page Bulletin G-17-A.

A775. Bristol Co., Waterbury, Conn. New 80-page thermometer catalog with information on theory and practice of modern thermometry. Covers liquid-filled, vapor-tension, gas-filled recording, indicating and controlling thermometers.

A776. Brown Instrument Co. "Modernization The Trend in Industry," particularly attractive folder, discusses temperature control in varied industries.

A777. Brown Instrument Co. "Instruments from the Executive Viewpoint" tells of savings effected in plants by use of automatic, accurate control.

A778. Climax Molybdenum, N. Y. City. March, *The Moly Matrix,* features "Practical Plus Economic Requirements Lead to Use of Moly Steel," a discussion of cyanided chrome-moly steel use in fuel oil pump rotors.

A779. Fisher Scientific Co., Pittsburgh. *The Laboratory,* Vol. 7, No. 5, commemorates the life and achievements of Hans Christian Orsted, first to produce aluminum in the metallic state. Booklet also illustrates many new, convenient pieces of laboratory or semi-works equipment.

A780. Hays Corp., Michigan City, Ind. Catalog RA-346 gives complete descriptions and engineering data for this company's line of combustion recorders. A brief article on combustion efficiency makes the booklet of more than average value.

A781. Ideal Commutator Dresser Co., Sycamore, Ill. New booklet announces "Thermo-Grip" electrically heated pliers, particularly well adapted to applying or removing solder lugs and for making sweat joints in modern type copper pipes, tubes and fittings.

A782. International Nickel, N. Y. City. "Nickel-Alloy Gear Materials and Their Heat-Treatments," by J. W. Sands and F. J. Walls, a 4-page folder reprinted from *Product Engineering,* Oct., '35.

A783. International Nickel. March-April *Nickelsworth* traces recent developments in Monel Metal use. Process industries may pick up many equipment hints in this booklet's brief items.

A784. Karl Kiefer Machine Co., Cincinnati. New catalog shows Kiefer "Vacuum Filling Machine" installations in several well-known plants.

A785. Lewis-Shepard, Watertown, Mass. Folder No. 318, "Profit Makers," lists materials handling equipment. Each item is illustrated and briefly described.

A786. Lewis-Shepard. Circular 199, illustrates several models of stackers and portable elevators, both hand and power hoist. Of value to plant managers seeking a method of conserving floor space.

A787. Lewis-Shepard. "Q" type floor truck, No. 1595, one-piece steel frame, arc welded and equipped with rubber balloon tires.

A788. Linde Air Products, N. Y. City. April *Oxy-Acetylene Tips* features a table on hard-facing materials data, a remarkably complete job. Physical properties, uses, applications and advantages of 7 different hard facings are listed.

A789. Linde Air Products. "Oxwelding Brass and Bronze," enthralling discussion of what represents a modern industrial art. Effects obtainable by fusion welding and correct flame adjustment are vividly pictured.

A790. Link-Belt. April *Link-Belt News* contains many items of interest to process industries using materials handling equipment.

A791. Pittsburgh Plate Glass. This booklet "letter" to company stockholders describes production of industrial paints, enamel, lacquers and varnishes. Of particular note is the part dealing with testing of films after application.

A792. Propellair, Inc., Springfield, Ohio. New line of circulator fans is announced in 4-page bulletin. All models may be operated at 2 speeds.

A793. Pulmosan Industrial Safety Equipment. Five sizes of standard industrial first aid kits, described and pictured in Form Y 835.

A794. Pulmosan Industrial Safety Equipment. Steel reinforced gloves, in many different models, are listed in form K 635.

A795. Roots-Connersville Blower. Bulletin 260-B13A, describing pump for shallow wells and cisterns. Pump is self-priming, vibrationless and silent. Table of capacities is included in the bulletin.

A796. Sullivan Machinery, Michigan City, Ind. "Unitair" compressors, 2-stage, completely air-cooled, V-type, are described in Bulletin 88-0.

A797. Stevenson Engineering, Detroit. "Motion in Window and Counter Display Advertising," an extremely valuable booklet for the chemical specialty manufacturer.

A798. F. J. Stokes Machine, Philadelphia. *Process News,* Vol. II, No. 1, tells how newer materials of construction are enlarging usefulness of process equipment. Booklet contains photos and engineering data describing units for pharmaceutical and process industry use.

A799. Thwing Instrument, Philadelphia. *Thwings Paper Tester,* 1st issue of this house periodical on paper testing, discusses important physical tests used in the paper industry.

A800. Harold E. Trent Co., Philadelphia. Trent electric heating elements and units are illustrated and complete specifications are given for each unit. Equipment listed includes both industrial and laboratory apparatus.

Packaging

A801. Bagpak, Inc., N. Y. City. "Vital Facts," pocket-sized booklet, tells of recent developments in the paper bag industry which makes these bags both chemically suitable and economically feasible for chemical and food packaging.

A802. General Plastics. Durez molded boxes, jars, displays and closures are illustrated for widely divergent industries, and presented as sales-aids.

A803. Hinde & Dauch. "Modern Shipping Boxes," attractive portfolio, illustrates suggestion for color, construction and design in making modern corrugated boxes.

A804. Package Machinery, Springfield, Mass. New folder calls attention to savings in packaging cost made possible by modern packaging installations.

A805. Phoenix Metal Cap, Chicago. For April, *The Phoenix Flame* takes us to Holland with tricky articles on customs, cookery and clothes. Sandwiched in between this local color, the reader will find some valuable items on packaging.

Received Late For Classification

A806. American Cyanamid. *American Hortigraphs & Agronomic Review,* May-June, contains many notes of interest to fertilizer producers and users. This booklet does much to unite the chemist and farmer into a mutually helpful producing-consuming unit.

A807. Du Pont Rayon Co. Du Pont's rayon-producing subsidiary has prepared an extremely useful collection of rayon data which takes the product from raw material to the latest model frock, answering important questions of control, properties, economics and application as it goes along. Simplicity of style makes the booklet of equal interest to laymen and technician.

A808. F. J. Stokes Machine, Philadelphia. *Process News,* Vol. II, No. 1, contains brief article telling how new construction materials are enlarging usefulness of process equipment. Illustrations and brief descriptions of various type equipment are included.

A809. Thiokol Corp., Yardville, N. J. April *Thiokol Facts* presents "A Rubber Plantation in N. J.", enthralling study of synthetic rubber production in this country.

Chemical Industries,
25 Spruce Street,
New York City.

I would like to receive the following booklets; specify by number: .....

.....

Name .....
Title .....
Company .....
Address .....

All information requested above *must* be given to receive attention.

A Five Year Plan for a Chemical Specialty Company

H. R. Drackett, President Drackett Co.

TWO years ago The Drackett Company—best known for their widely distributed "Drano" and "Windex"—laid out what they jokingly called among themselves their five-year plan. It was a carefully thought out program of expansion into new markets by the means of new products.

Both in markets and in products when they said "new," they meant it. For their plans were based upon research to take them into new, unexploited chemical specialty fields and to carry them beyond the well explored business of mixing and packaging.

To date that five-year-plan has been carried through rather better than to scheduled results. Although there has as yet been no addition to the handsome red brick factory buildings out on Spring Grove Avenue, in Cincinnati, nevertheless there has been a very considerable investment in new equipment. And what is, in these times, a great deal more important, there are, as a result of the program of development, a third more employees on the payroll.

These are tangible contributions to recovery. The lag of the so-called "heavy industries" and the drag of nation-wide unemployment are two of the big blocks on the path to prosperity, and the Drackett Company has evidently been doing more than its bit in its equipment buying and its new hiring.

Other direct evidence of the success of the plan is presented by the sales record. For every single month of 1936, sales have comfortably exceeded the quota set. As President H. R. Drackett says, "We're pretty sales-minded here, and it's hard for us to underestimate a sales quota. So, when we consistently better that quota, we have done something."

But today that eminently successful program of expansion has been held up. Deliberately, and for an indefinite time, the development plan has been suspended. For very excellent reasons the company is marking time.

"When, two years ago, we carefully drew up this plan," explained Mr. Drackett, "we provided that the funds for all this research and expansion were to come from a surplus retained from earnings. With each major step plotted far in advance, we naturally had a program that for each of the five years would call for heavier and heavier expenditures. We have been planning, at the same time, to meet these growing expenses without doing any gambling on current sales, and so we have frugally been building up our surplus. You can see how the Government's proposal to put a punishing tax on corporation surpluses completely overturns our whole campaign.

"Either we must pay what is avowedly an exorbitant tax, or we must turn our surplus over to our shareholders. Even relief for companies who must pay debts out of surplus, does us no good. It looks as if we were being crippled merely because we were provident enough to plan ahead, and thrifty enough to adopt a pay-as-you-go program.

"What is most puzzling to me," he added, leaning back and looking out of the window, "is the attitude of the Government. Here we have an Administration which is avowedly trying to help the forgotten man, the handicapped class, the small business. How can they arrive at a tax which those of us who are actually in business know is going at once to play into the hands of the bigger interests, and to maintain high prices for goods to consumers in greater proportion than almost any other kind of a tax they might have devised?

"Take our own business as a specific example," he continued, leaning forward. "I see by the papers that any business with $10,000 net profits is considered 'big business.' Well on that definition we deserve to be 'punished'; but we have always considered ourselves a small business. We were built up and financed personally, and while we are a corporation with some two dozen stockholders, many associated with the enterprise, if we cannot use our scrupulously saved-up surplus to carry through this expansion program, it must either be abandoned or we must go to some capital financiers for the funds. That means either we have to sell bonds or stock, either of which will then become a very distinct addition to our overhead charges.

"Now that increase in overhead is diametrically opposed to our own plans which were to a great measure predicated upon new products and new markets which would reduce the overhead costs of our whole business, or in other words, reduce the necessary burden of profit per package. In this way, we might either sell a bigger package for the same money or else lower the retail price—either would mean bigger sales for us and more value for the consumer. I have often been impressed with how well this theory is practiced by the whole chemical industry. Chemical prices over the years keep coming down, down, down. It is extremely significant in my opinion that on the whole our chemical corporations, large and small, have been financed so largely out of their own earnings, out of surplus if you will, and so have, compared with other industries, but a light burden of bonded debt.

"One of the great benefits—a great public benefit making for the more abundant life through greater abundance of cheaper and better goods—that flows from the strong financial position of a chemical manufacturer, is that he can carry on a well thought-out program of research and expansion, and then be in a position to pass on to the consumer promptly the results of his improvements and discoveries. With bond interest to pay and refunding to be provided for, such improvements do not so quickly get translated into lower prices.

"Our own modest, five-year-plan was built on just such a foundation as this. A great many years ago, I remember reading in CHEMICAL INDUSTRIES an editorial that warned any chemical maker that he had best have a 40 per cent. edge on what he believed his most important competitor's costs to be before he began to make a new chemical. I have never forgotten that, and we have been developing some really new products and searching out some really new markets for chemical specialties. I hope we shall not have to abandon this likely line of research. But at the moment, we have to hold it all in abeyance."

Industrial Soaps

Review of the 40 Million Dollar Market in Detergents

By Benjamin Levitt, F. A. I. C.

IF we include soap used by power laundries under this heading, half of all soap produced in the United States is for industrial purposes. Based on our 1933 production, the industries consumed approximately $100,000,000 worth of soap, and this in time of depression.

Textile Soaps

Several years ago *The Textile World* stated that American mills consumed between 25 and 30 million dollars' worth of soap annually, and divided this among the several branches of the industry as follows: wool 45%; silk 35%; cotton 15%; and miscellaneous 5%. Obviously various textile materials, differing as they do in chemical and physical characteristics, require different treatment from the raw to the finished products. Hence, they require various soap compositions in processing.

Soap and Scouring Oils for Wool

Wool requires the greatest amount of soap. The raw wool carries considerable dirt, swint, woolfat, blood and whatnot, which the sheep acquires during its lifetime and oft-times in the slaughter house. All this foreign matter must be removed as a preliminary treatment.

Experience has shown that soap made of low titer oils not only cleanses the wool thoroughly, but also imparts the soft and lofty "handle" to the goods, that is so desirable. A product known as Olive Fig Soap, made from olive oil foots and potash, is preferred by most wool scourers. Occasionally, red oil (oleic acid) or other oils are substituted in this compound for olive oil. The soap is generally sold on the basis of 50% fatty acid content, and contains a fraction of a per cent. of free alkali to counteract the woolfat in the raw wool. It is used with pearl ash or soda ash in the scouring bowls.

Besides using straight oil soaps, various soap compositions are made containing solvents such as carbon tetrachloride, trichlorethylene, ethylene dichloride, cresylic acid, diethylene glycol, pine oil, etc. Cresylic acid soap is considered as being an efficient blood solvent, which is desirable in wool scouring. The latter compositions comprise the so-called wool scouring oils, because they usually are liquid, and have an oily appearance.

For fulling, a process which takes place in hot water, wherein the goods are shrunk, the trade prefers soap made of palm oil and caustic soda. Palm oil is a hard high titer oil (45° C.) and the soap suds better in hot water than do low titer oil soaps.

Olive oil soda soaps are used in the final wash after dyeing.

Silk Soaps

Natural silk, as it arrives at the mill, contains about 25% of silk gum and dirt. The filaments are stuck together at points where they are twisted in the hank. All this must be softened, loosened and finally degummed or boiled off, before the silk is dyed and finished.

The first process is soaking—this softens the sericin gum and lubricates the fiber to prepare the silk for winding and throwing on cones. The process is carried out in an emulsion consisting of olive or neatsfoot oil and soap, or in an emulsion of sulfonated oil, soap and water. Such soap is made of olive oil foots and caustic soda, or of oleic acid and soda. It is marketed in several forms; namely, solid in barrels, 4 pound bars, chips, and powder.

Hosiery is knitted in the gum, which means that the silk still contains the original sericin and also part of the soap and oil used in the soaking bath. Before dyeing, the gum and oil must be removed by "boiling off" with soap. The dye is then added and the boil off liquor (containing some of the soap) acts as a leveling agent for the dye. Boil off oils, so called, are frequently used to accomplish the same purpose. These consist of liquid soap made of potash, turkey red oil (sulfonated castor oil), oleic acid, olive oil, sodium silicate, glycols, cresylic acid, pine oil or other solvents. The boil off oils have the very desirable property of instant solubility.

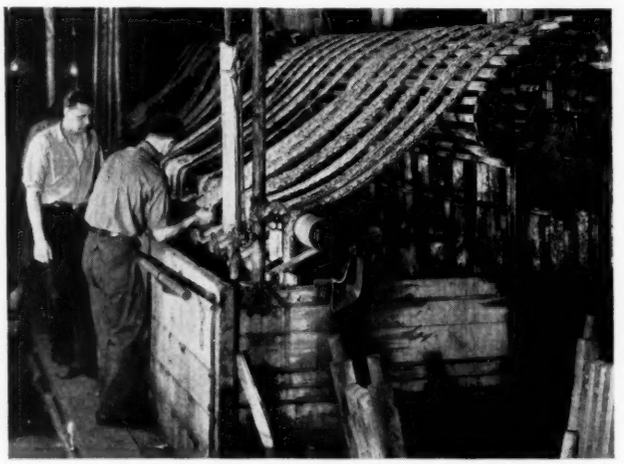
The finishing materials for silk also contain soap which furnishes the vehicle for glue, vegetable size, pigments to act as delustering agents, and metallic soaps to serve as splash-proofing.

Soap for Cotton Goods

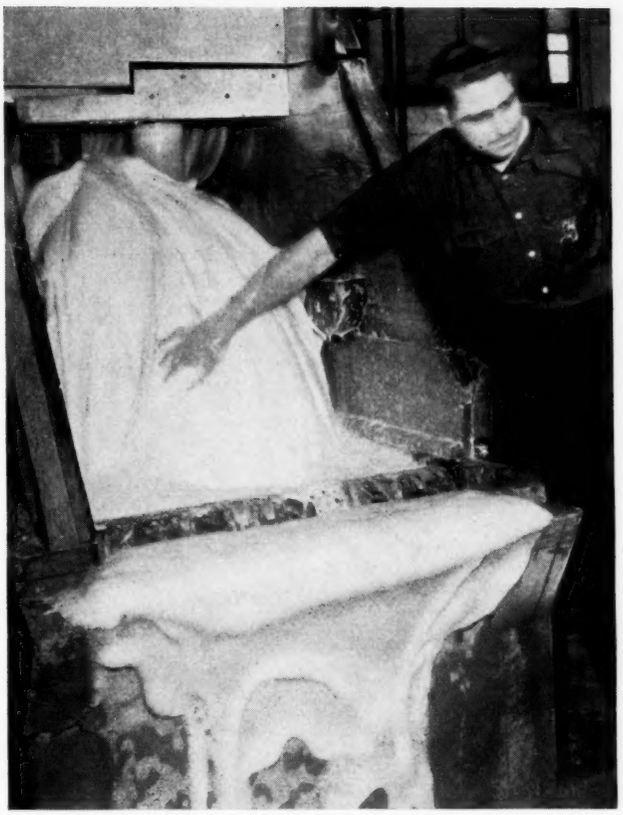
Raw cotton contains pectins, oil, coloring, albuminous matter, and dirt. These are boiled out with tallow or rosin soaps and caustic soda or soda ash. The tallow soaps are neutral and contain 88% anhydrous soap. They are usually sold in chip and powdered form. Since cotton is scoured in very hot solution, tallow soap gives best results, and is preferred to any other type. This soap is used in slashing compounds, printing pastes and for scouring after printing or dyeing.

Rayon, generally speaking, is a pure fiber, and does not require much soaping.

The paper industry consumes a large tonnage of soap for two main purposes. In those plants where rags are employed as the stock, the latter must be thoroughly scoured before it enters



Rayon washing in a dye and print works. Photograph courtesy Colgate-Palmolive-Peet.



Scouring paper mill felts with Olate. Photograph courtesy The Procter & Gamble Distributing Co.

the beaters. Tallow soap is the ideal, but rosin soap is also used. In the preparation of size, rosin soap and alum are used to a very large extent. One enterprising manufacturer is now preparing sodium resinate in anhydrous powdered form especially for paper manufacturers.

Soap for Metal Industries

The process of wire drawing consumes large quantities of soap, most of which is sold in powdered form. Soap is used in the die box, to lubricate the die, and to prevent scoring and overheating of the wire. For this reason the soap must be heat resisting. Palm oil, which has a titer of 45° C., is used in the form of powdered soda soap. Mixtures of palm and tallow-soaps are also satisfactory.

The Ordnance Department, U. S. Army, purchases soap chips for drawing brass cartridge cases. Briefly, the specifications are as follows: the soap shall be compounded of mixed fatty acids, which contain a small amount of tallow, and not an excessive amount of palm oil or palmitic acid. The soap jell used in drawing (8½ pounds of soap to 45 gals. of water) must have a body which shall furnish a film that withstands drawing pressures of punch and die operations. The moisture shall not exceed 4.50%; insoluble in alcohol 3.0%; free sodium carbonate not over 1.50%; titer of mixed fatty acids about 40° C.

Tallow soap is used in burnishing. Various compositions of soap, oil, tallow, chalk, magnesia, pumice, etc., are used in finishing and polishing metals. It also furnishes the base for the production of metallic stearates.

Cutting Compounds

Though cutting compounds are not entirely soap, the role played by soap in the production of these specialties is very important. For some cutting operations, emulsions of sodium resinate, or of sulfonated oil with animal, vegetable and mineral oils, are used.

Technological Paper 204, Bureau of Standards, states that "soap has the advantage that if oil is added, it will readily form an emulsion which will possess the cooling properties of water, and will lubricate better than water, either alone or containing soda or soap."

Bingham, Tech. Paper 204, further states that the following formulae produce very desirable cutting oils, from the standpoint of both economy and efficiency. These are especially good where heating is excessive and may be used for the most difficult as well as the lightest work.

Formula No. 1

Water	2	Gals.
Alcohol	1.5	"
Caustic Soda 30B.	.75	"
Kerosene	6.00	"
Oleic Acid	3.00	"
Machine Oil	21.00	"
	34.25	Gals.

This amount of soluble oil is then diluted to make 860 gals. for average work.

Formula No. 2

Caustic Soda	0.65%
Alcohol & Water	5.80
Resin Acid	1.64
Fatty Acids	11.76
Mineral Oil 22½B.	80.15
	100.00%

Diluted one part oil to three parts of water, this is said to do the same work under all conditions that is required of pure lard oil. The addition of disinfectant materials to both formulas is desirable.

U. S. Navy Paste Cutting Compound

Composition: To be a soluble paste compound consisting of an alkali soap, mineral and fixed saponifiable oils and water. To be free from disagreeable odors, mineral acids, or any ingredients injurious to persons handling the material. It is to contain not more than 25% water, not more than 20% alkali soap, not less than 40% mineral oil, and the remainder fixed saponifiable oil. It must form a stable emulsion when mixed with water.

Dry Cleaners' Soap

A dry cleaners' soap is one which is soluble in the solvent naphtha. This consists of a red oil soda or potash soap about 50% saponified. An average composition is represented by the following:

10 lbs. Oleic Acid
7 " Naphtha
1 " Caustic Potash
2 " Water

There are many variations of this formula, some containing alcohol, or other solvents, others calcium soap, etc.

Besides the above, this industry utilizes a considerable quantity of wet washing soap. The latter is used to scour garments in water, because they are stained by materials which are insoluble in the petroleum solvent. It is a potash-coconut oil soap, very soluble in cold water. Hence it does not cause running of colors. It is also used in rug cleaning.

In conclusion, lesser uses of soap are found in the rubber industry, where tallow soap is used for swabbing the molds to prevent sticking; fish oil soap as a spreading agent in the manufacture of insecticidal sprays; olive oil soap in pharmacy for pills and suppositories. Sodium resinate described above may also be used as a base for the production of pine oil and coal tar disinfectants.

Cements for Flooring

By Charles F. Mason, Ph. D.

THE recent and rapidly progressing tendency of using artificial flooring materials necessitates due consideration of the bonding agents by which they are affixed to their foundations. Such flooring materials comprise rubber and mastic tile, linoleum, cork and hardwood which are laid upon wooden, steel or concrete foundations and bonded by layers of plastic cements which vary from ¼ to 1½ inches in thickness without the use of tacks, nails or other mechanical aids. The advantages are obvious; namely, avoidance of air currents and sound from below, squeaking of wooden floors, and the presence of a waterproof bond which prevents seepage of water during and after washing.

In fact, a bonding cement is the only solution of the problem in special cases like mastic tile which are not provided with nail holes; heavy linoleum which upon aging in a dry atmosphere would have a tendency to bulge and become uneven in modern fireproof buildings, and upon steamboats where cement and steel are the respective foundations. One bonding medium which would be satisfactory for such a group of materials, varying widely in physical and chemical properties, would have to meet many specifications: adhesion, ease of application, retention of plasticity, absence of volatile solvents which would be locked in, and, most important of all, absence of substances which are injurious to the overlying floor.

It is strange that this class of materials has been neither the subject of many patents nor of speculation by producers of modern materials of a synthetic nature as the following formulas will show. Recently there has been some activity among linoleum manufacturers who have attempted to extract the binding portion of scrap linoleum and by retreatment make a linoleum cement. The only other activity has been the introduction of by-products like waste sulfite liquor from the paper mills, cumar indene resins from the treatment of coal tar, and treated vegetable oil foots.

Lack of foresight in the choice of bonding agents with subsequent treatment of the overlain floor by wood stains and penetrating waxes of the spirit type has led to many losses and damage suits. One case is a parquet floor where the under surface of each board is dipped into hot mastic and then laid into a bed of cold mastic which has been spread over a concrete floor. Subsequent treatment of the upper surface with a wood stain resulted in seepage through the joints, solution of the mastic, and by capillary action a streak of black mastic upon the upper surface of each joint. A little foresight would have suggested the use of a stain dissolved in alcohol, a non-solvent for mastic, instead of the aromatic and aliphatic solvents of the stain used.

Another interesting case is that of a building superintendent, responsible for the appearance of 20,000 sq. ft. of mastic tile floors, who, because of slipperiness, had abandoned the use of water wax emulsions or aqueous solutions of gums like shellac. However, he solved the trouble to his own satisfaction and that of the owners by washing daily with soap and water in which some mineral oil had been emulsified. Naturally, the floors were no longer slippery because the film of oil deposited upon the surface exerted a solvent and softening action and kept it semi-plastic, but the damage was done by the oil which remained in the joints between the tile and in a short time every tile could be lifted out with the fingers.

The formulas show in order the entire progress which has been made in this class of cements since 1904. Formula No. 1 is impractical in that 35 pounds of gums are to be dissolved in 10 pounds of solvents, something which is impossible. Moreover, the Manila copal gum which is not soluble in first oil (an aromatic distillate) would have to be dissolved in the alcohol first, or separately, and likewise the rosin would have to be dissolved in the first oil and then the three (two varnishes and molasses) are to be mixed. Undissolved gums would be present, and the water soluble portion of the molasses would render the bond useless.

No. 1.

1904.	Manila Copal	10	
	Molasses	55	
	Rosin	25	
	Alcohol	5	
	First Oil	5	Material cost $0.23 per gal.

No. 2

1911.	Chalk	71.43	
	Linseed Oil Boiled	11.43	
	Gas Tar	10.00	
	Rosin Oil	4.28	
	Rubber Solution	2.85	
	Manganese Borate	0.0028	Material cost $0.31 per gal.

No. 3.

1931.	Chalk	70.00	
	Oil Non-Drying	20.00	
	Carbon Disulfide	10.00	Material cost $0.38 per gal.

No. 4

1932.	Cumar Resin	30.00	
	Benzol	15.00	
	Clay	55.00	Material cost $0.31 per gal.

No. 5

1933.	Rosin	18.00	
	Cellulose Nitrate	15.00	
	Alcohol	30.00	
	Acetone	27.00	
	Amyl Acetate	10.00	Material cost $1.10 per gal.

No. 6

1934.	Linseed Oil Blown	20.00	
	Cellulose Nitrate	6.66	
	Rosin	6.66	
	Ester Gum	6.66	
	Wood Flour	10.00	
	Ethyl Acetate	50.00	Material cost $1.25 per gal.

No. 7

1934.	First Coat		Second Coat	
	Tung Oil	33.33	Sulfite Liquor	30
	Amberol Resin	8.33	Clay	40
	White Lead	8.33	Water	30 $0.13 gal.
	Ground Cork (40 M)	8.33	Or	
	Varnoline	20.83		
	Naphtha High Flash	20.83	Dextrin	60
	$0.70 per gal.		Talc	20
			Water	20 $0.39 gal.

No. 8.

1934.	Rosin	50	
	Linseed Oil	150	
	Binder from Scrap Linoleum	50	$0.80 per gal.

No. 9.

	Asphalt	40	
	Clay or other inert filler	60	$0.13 per gal.

Formula No. 2 is very satisfactory for bonds of linoleum to concrete or steel but would be dangerous for rubber and mastic due to the presence of rosin and linseed oils. Formula No. 3 is impractical because of the presence of poisonous carbon bisulfide and the non-drying oil which possesses little or no adhesive properties. Formula No. 4 is very satisfactory if allowed to stand for an hour or more to allow evaporation of the solvent; and the remaining varnish, having excellent adhesion, is flexible

and durable. However, it could be improved by the introduction of a varnoline soluble cumar resin with the elimination of the toxic benzol.

Formulas Nos. 5 and 6 are of the lacquer type and although possessing good qualities are too expensive for general use when such cements are sold for $0.23 per gal. Formula 7 which comprises the additional labor of applying two coats with a long intermittent interval for evaporation of the solvents followed by the application of an aqueous adhesive is good only in special cases where the foundation is defective and needs sealing. Formula No. 8 is very satisfactory and used widely, but oddly in large cities where concrete is the prevailing foundation Formula No. 9 is the one in universal use with some modifications such as the introduction of a linseed oil rosin varnish or a spirit varnish of the Manila copal alcohol type.

The type of asphalt chosen is very important in that those which are by-products from the petroleum industry, and are termed cut-backs, retain an unpleasant odor, and even though they possess a progressive hardening action are subject to changes in temperature. Especially under linoleum this results in impressions. However, this difficulty and that of thorough mixing of such a viscous mixture with the filler has been overcome and such materials are meeting the purpose.

Poisons for Rodents Discussed at British Meeting

American exterminators will be interested in the digest of a discussion on "Poisons for Rodents" held at the College of the Pharmaceutical Society in London by the University of London Animal Welfare Society.

J. G. Wright (lecturer in surgery and materia medica, Royal Veterinary College) read a paper on "The Pathological Effects of Poisons." Fumigation, he said, was better for burrows and warrens. Hydrocyanic acid gas was the most effective agent. The poison-bait method was of the greatest service for the destruction of rats infesting buildings, and the following agents the most convenient: Arsenic trioxide, potassium arsenite, barium carbonate, phosphorus, red squill, strychnine, and salts of thallium. Under the new poisons legislation, the use of poisons for killing vermin would be greatly restricted. The inclusion of barium carbonate in Part II of the Poisons List and the elimination of red squill from the List was considered by the Poisons Board to be sufficient to meet the public demands. Phosphorus produced extensive fatty degeneration of the tissue cells, particularly of the liver, kidneys, and heart. Red squill acted upon the central nervous system, there being little effect on the alimentary canal or circulation. Strychnine was rapidly absorbed, and the symptoms of poisoning commenced in from 15 to 30 minutes after ingestion. Its chief action was on the spinal cord and the brain. The best of the poisons were those which had a depressant action upon the brain without any preliminary stimulation, but most of these narcotic poisons were costly and uneconomic, and many had a nauseating taste and would be refused. The most toxic were those containing halogen radicals. Others were chlorbutol and tribromethyl alcohol. Of the barbiturate group, he thought phenobarbitone would be the most suitable.

A paper was also read by J. D. Hamer, F.I.C. (consultant chemist to the Orient Line), on "Chemical Rat-Control in Ships and Docks." For the destruction of rats, said Mr. Hamer, the most effective method was the use of hydrogen cyanide. Traps and bait poisons at their best were only partially efficient. Arsenic, strychnine, phosphorus, barium and thallium preparations were all extremely dangerous to use on a large scale, on account of the difficulty of controlling the access of other animals.

T. Howard, of William Howard and Sons, described some methods of laying baits designed to outwit the intelligence of the rat, which he described as extremely high. He took the view that a quick-acting bait poison of high toxicity is the most humane, but such poisons must be used by professional rat-killers and cannot be sold to the general public.

The meeting was characterized by a strong and almost unanimous recognition of the desirability not only of combating the rat menace in a more effective manner than obtains at present, but also of doing this by such methods as will inflict a minimum of suffering.

Conclusions to be drawn from the general discussion are as follows: (1.) Hydrocyanic acid gas, usually produced from calcium cyanide dust or a kindred product by hydrolysis, is the most humane and also the most effective poison when blown into the burrows of rats and rabbits. Out of doors it can be used by any responsible person, but indoors it is dangerous to human life except in the hands of experts. (2.) All the bait poisons at present in use by the general public act very slowly, taking from one to 3 days to kill, with the exception of strychnine. (3.) All such poisons inflict severe pain; but opinions appeared to differ as to whether this is true of red squill. (4.) Research with a view to the recovery of more humane poisons might take the direction either of the addition of a suitable narcotic, as suggested by J. G. Wright, or of an endeavor to identify the rat-toxic component of red squill, and to develop a compound of similar type which would act more quickly.

It was also brought out that about 5 years ago it was found that not only the dried red squill powder, but also the moistened material mixed so as to form the complete bait, could be stored for at least a year without reduction in toxicity when sealed in tin cans or glass jars. This canned bait has now been subjected to thorough trial, over 300,000 half-lb. cans having been distributed to farmers and others during the past year or two, with results that came in every way up to expectations. British *Chemical Trade Journal*, Mar. 13, '36, pp. 212-215.

Formula for Controlling Leather Jackets

An emulsion of orthodichlorobenzene and Jeyes Fluid has been employed successfully in England for the control of leather jackets (the grub of the crane fly) and for other insects infesting golf greens. *Chemical Synonyms and Trade Marks* by William Gardner defines Jeyes Disinfectant as containing creosote, rosin, caustic soda, and water.

Lead arsenate is now undergoing critical examination as an agent for leather jacket control, and the toxicity of the chemical and the relative toxicity of various commercial forms is being investigated, in addition to the optimum time of application.

During the early summer, continues the report of the Board of Greenkeeping Research at the St. Ives' Research Station, Bingley, Yorkshire, England, a new commercial form of lead arsenate appeared on the market which, although constitutionally identical with the powder material, is physically different, as it is in a liquid form with very much reduced particle size and contains approximately 50% of lead arsenate. As its use in other spheres of insect pest control suggests that it may be more efficacious for earthworm elimination than the powder, the material, at 2 rates of application, has been incorporated in critical experiments laid down during September designed to study in detail the immediate and ultimate effects of lead arsenate in various forms and in conjunction with other materials upon earthworm activity, turf development and weed control. Whether the action of lead arsenate is due to the lead or arsenic radical is also being investigated, as this matter has an important bearing upon the future work on vermicides. A series of observational plots including various fluorides and fluosilicates was laid down in September with a view to the further development of this work.

Household Specialties

Insecticide Makers Pick Convention Dates

The National Association of Insecticide & Disinfectant Manufacturers has finally decided on June 8-9th as the dates for the semi-annual meeting in Chicago and again the Edgewater Beach Hotel has been selected. Many members will arrange to arrive on June 7th which is a Saturday.

There is little likelihood of an official tie-up between the association and the Pacific Coast Insecticide Association, but the friendly exchange of data between the 2 organizations will be continued.

Benzyl Phenols as Germicides

Immortal Lister of England was the 1st to use a synthetic material, phenol, as a germicide. Cresols later largely displaced phenol, and in the intervening years constant research has been conducted for new products and to study the effect of diluents, such as water, on the germicidal power. Benzyl phenols, Dr. T. S. Carswell and J. A. Doubly of Monsanto report, show high germicidal power by themselves and some of them are relatively little affected when combined with solubilizing agents In general, unsubstituted benzyl phenols are least affected and approach the ideal of effectiveness against different types of bacteria. Their paper, read before the A.C.S. at Kansas City last month, described the behavior of the different benzyl phenol series when formulated with sulfonated oil. It is planned to extend this work to the study of the behavior with soaps, wetting agents, alkalies, and organic solvents, such as alcohol and glycerine.

Exterminators Plan Advertising Contest

A committee of the National Association of Exterminators & Fumigators is making a careful study of the types of advertising and publicity employed by exterminators and a full report will be made at the Cleveland convention in October. Meanwhile, officers of the association are offering the constructive suggestion that members and others watch their advertising and publicity notices so that they are free from exaggerations, misleading or false information. Incidentally, the secretary of the association reports that a prize will be given at the meeting for the best exhibit showing advertising material, forms, etc.

Members of the National Association of Exterminators & Fumigators are requested to remember to send the data on advertising material, forms, etc., to R. W. Laing, 2196 Bellfield ave., Cleveland, who will arrange for their suitable display at the national convention in that city scheduled for Oct. 26-28.

The Association officers are urging upon the members the necessity of cooperating still further on the matter of lower insurance rates. If those who have not supplied the secretary, William O. Buettner, 3019 Fort Hamilton Parkway, Brooklyn, with the necessary data will write him, he will be glad to send the necessary forms for reply. Through the efforts of the Association a rate reduction is expected to go into effect sometime in May.

Merchandising, Advertising Plans Reported

Chemical Control, Inc., of N. Y. City, manufacturer of Moth-Surance, has appointed the Mackay-Spaulding Co. to direct its advertising account. Moth-Surance is a liquid for destroying moths and larvae, for home use. This product up to now has been used for protecting clothing, furs, rugs, etc., by large moth-proofing services. Newspapers will be used to acquaint the home market with the product.

A novel form of tie-up advertising—the featuring of its famous radio team, Fibber McGee and Molly, as the stars of a marionette show—is being tried by S. C. Johnson & Son. The puppet show, which lasts 10 minutes, has begun a series of one-week stands in leading department stores. Sixteen bookings are contemplated, although, if the show continues to be as successful in boosting sales of Johnson's Glo-Coat as indicated by its premier, the "season" will doubtless be extended.

Bon Ami is offering $5,000 in cash prizes in answer to the question, "What Do You Like Best About Bon Ami?"

One of the biggest spring advertising campaigns in the history of the Tintex Tints & Dyes Co. was launched last month in 125 newspapers of 90 cities

S. C. Johnson & Son, Inc., Racine, Wis., has begun a newspaper campaign in New England for Glo-Coat furniture polish, with coupon offer of a trial can.

Colgate-Palmolive-Peet is using newspapers and the radio to promote its offer of a finger brush in conjunction with the sale of Super-Suds. Brush, claimed to be worth $1, will be given for 10c and tops from either two 10c packages or one 20c package of Super-Suds. W. R. Veale, manager of the company's soap department, states the offer is the result of the success achieved in giving a complexion brush with the sale of Palmolive soap. The latter premium has greatly stimulated the sale of Palmolive, he said, and its offering has been extended for 3 months. Benton & Bowles handle the account.

James Thurber cartoons and jingles will feature the forthcoming campaign for "Bug-a-boo," the insect spray manufactured by Socony-Vacuum Oil. Three national weeklies will be included in the magazine series, while the spray will also be promoted on various Socony-Vacuum radio programs, including baseball broadcasts in Boston, Syracuse and Detroit. Counter cards and window displays will also be used in the campaign, which has been prepared by J. Stirling Getchell, Inc.

Attacks Moth Guarantee Advertising

H. A. Nelson, vice-president of Chemical Supply, large Cleveland manufacturer of chemical specialties, in a letter to *The American Carpet and Upholstery Journal*, points out that the action of some manufacturers of rug cushions in giving a guarantee against moth damage very likely gives a false sense of security to many for the rug itself remains subject to moth attack. He has also addressed a letter on the same subject to members of the insecticide industry entitled "Another Threat to the Insecticide Industry. He will gladly send a copy of this to anyone requesting it. He may be addressed care of the company at 2450 Canal Rd., Cleveland.

With the Household Specialty Companies

Fuld Brothers, Inc., Baltimore, are making preparations to assemble all of their manufacturing departments and offices into their new building which provides triple the manufacturing space of their present quarters. It was announced recently that this well known firm of specialty chemical manufacturers would obtain occupancy of the new Fuld Building located on South Wolfe, Aliceanna and Durham sts., with the offices at 704 S. Wolfe st., about May 15. As alterations and new installations proceed, in the new location, manufacturing schedules are being maintained at the old building on Frederick ave. Removal is necessitated earlier than had been anticipated due to the unprecedented expansion during the past year.

The Kleen Co., 235 W. Wyoming ave., Philadelphia, has gone ultra-modern in its packaging ideas. That is the newest development in the company's drive to make the average man and woman floor-conscious and to acquaint them with the fact that floors may be economically reconditioned with complete emancipation from hard work and costly labor.

Joseph L. Schwartz, general sales manager, is the man behind the idea of dressing the package to make it as good in appearance as the product is in performance.

He collaborated with the artists and designers who turned out the new color schemes and containers which will call atten-

tion to the company's "Kleen and Bleech" in merchandising efforts after April 15.

J. B. Magnus, vice president of Magnus, Mabee & Reynard, essential oils, N. Y. City, reports appointment of Ralph S. Barlow as Massachusetts, Vermont, Rhode Island and Maine sales representative. Mr. Barlow will make his headquarters in Boston. He succeeds Harry K. Mundorf.

The Messanna Laboratories, Little Rock, Ark., shipped over 250,000 bottles of insecticides last year. R. A. Barksdale, owner, reports "Every month in '36 shows a decided increase in business."

Joy Products is packing various surprise gifts in its Joy cleaner and water softener.

Bonide Chemical, 382 Genesee st., Utica, was fined $50 for interstate shipments of misbranded insecticide last month in Federal Court at Syracuse, N. Y.

Steraliza Co., Detroit, is marketing "Lizzie The Perfect Maid," a household hypochlorite bleach. Anchor Cap & Closure made a special cap for the bottle.

Plan for Marking Consumer Goods Offered

A project to raise the level of reliability of "approval," "certification," and "listing" systems used in the marking of consumer goods has just been proposed by the Association of Consulting Chemists and Chemical Engineers in a request to the American Standards Association.

Such approvals, certifications, or listings by responsible agencies are of great potential value to the public and to responsible producers and distributors but, according to the Chemists' Association, this value is being dissipated by irresponsible endorsements that claim a significance they do not possess.

Proposal of the testing engineers and chemists, many of whom are heads of laboratories, has been favorably passed upon by the National Bureau of Standards, the National Association of Purchasing Agents, the American Home Economics Association, the Consumers' Division of the Dept. of Labor, and the American Society for Testing Materials.

Plan is to set up standard practices covering fundamentals which should underlie valid approval procedures—such standards to be developed cooperatively by consumers, producers, distributors, and advertisers, through the American Standards Association. The Chemists' Association believes that such standard practices will thoroughly justify consumer confidence and thereby help to build consumer acceptance of sound approval systems.

New Specialty Companies in the Field

Davenport Chemical, 5th & Market sts., Camden, N. J., is a new company in the household chemical specialty field.

Raleigh Cleaning is a new manufacturer of solvents, cleaners, polishes and waxes at Stockton, Calif. Company is incorporated for $25,000

Azuria Chemical, 1032 Lovers Lane, Akron, Ohio, is a new company formed to make disinfectants, insecticides, liquid floor wax, furniture creams, metal polishes and other household chemical specialties.

Personal and Personnel Notes

C. Norman Dold, president of the Association of Exterminators & Fumigators, has been ill for several weeks with a serious streptococcus infection of the ears.

P. M. Petersen, who has been with S. C. Johnson & Son, Inc., Racine, Wis., for 25 years, has been appointed general sales manager. He succeeds C. A. Armstrong, who for the last 23 years has been acting head of the sales department and who continues with the company as vice-president and member of the board of directors.

Dr. Hugo Hartnack of the Hartnack Exterminating Co. of Chicago took a few extra days to visit with officials of the Bureau of Entomology in Washington before starting on a 45 days cruise to South America via the Panama Canal. Incidentally, Dr. Hartnack was much interested in seeing the enlarged fumigation vaults of the Mahler Exterminating Co. located in Brooklyn, N. Y.

George A. Rader of Berkeley, Calif., has just been elected to the place on the board of the National Association of Exterminators & Fumigators created by the recent death of Director Harper.

Distributes Service Booklet

Chemical Specialties Information Service has recently published a pamphlet outlining the nature of the service and listing the products covered since its inception in '31. This cooperative service is maintained for the information of manufacturers of chemical specialties at a nominal cost to the cooperating firms. A copy of the pamphlet can be obtained by addressing Foster D. Snell, Inc., 305 Washington st., Brooklyn.

Federal Trade Commission Rulings

Ring-less Cleaning Fluid Co., 125 W. 33rd st., N. Y. City, distributing "Ring-less" and Neverring" cleaning fluid, will no longer use on labels attached to containers of its product the representation "not injurious to the most delicate of materials," or other assertions implying that the colors of certain fabrics dyed with non-fast or fugitive dyes will not be injured by application of this fluid. Fluid also will not be represented as being capable of removing stains or spots of whatever kind or character.

Victor Soap, Dayton, Ohio, trading as Royal Soap Co. and as Heick Soap Co., has been ordered by the Commission to discontinue unfair methods of competition, including misrepresentation of the incomes salesmen may earn in selling the respondent's products. Radiator Specialty, Charlotte, N. C., dealer in a cleaning fluid advertised as "Perfo," has been ordered to cease and desist from misrepresentations in the sale of the preparation.

Engaged in the manufacture of a rat and roach exterminating powder, Walter E. Perry, trading as Bestyet Products Co., Burlington, N. C., stipulates that he will desist from using in advertising or on labels assertion that his product kills rats or mice and leaves no odor. He will also discontinue any representations tending to deceive buyers into believing that his product will kill rats and mice and will mummify or dry up the dead bodies without leaving an odor, when this is not true. Perry agrees to cease employing on labels or otherwise the contradictory statement that the product is a "mild poison compound of 14 different rat foods, not poisonous."

Industrial Specialties

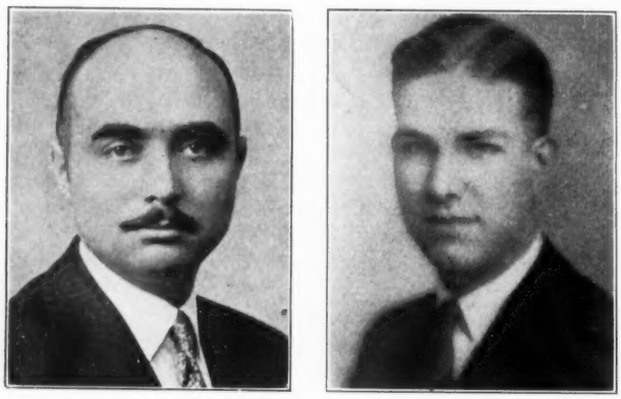
Specialty Makers Exhibit at Knitting Show

Textile chemical specialty houses who displayed their products at the 32nd Knitting Arts Exhibition included American Aniline & Extract, Philadelphia, with a demonstration of a new method of degumming by the use of Orthopol; W. F. Fancourt & Co., Philadelphia, textile soaps, oils, products for dyeing, degumming, delustering, and oils for conditioning and soaking silk and rayon; J. B. Ford, Wyandotte, Mich., cleansers; and W. H. & F. Jordan Jr. Mfg. Co., Philadelphia, textile oils, softeners, penetrating agents, disinfectants and insecticides.

Also Laurel Soap Mfg. Co., Philadelphia, soaps and a general line of textile specialties; The Neva-Wet Corp. of America,

N. Y. City; Onyx Oil & Chemical, Jersey City, N. J., new developments for boiling-off and finishing hosiery and underwear; Standard Oil of Pennsylvania, textile oils; Warwick Chemical, West Warwick, R. I., finishing compounds and throwing oils; and Jacques Wolf & Co., Passaic, N. J., a very complete line of textile chemicals. Among the products shown by members of the Wolf organization were Loupole W-950, hydrosulfites and stripping agents such as Hydrolite W-923, delusters, finishes, softeners, oils including Monopole Oil, Oratol W-746C, sulfonated olive and castor oils, soluble fine oils, soaking oils for the knitter, weaver and throwster, and boil-off oils.

Scholler Brothers, Philadelphia, in addition to exhibiting a complete line of specialties, featured Kastilene, a protective agent for use in the dye bath on pure silk, wool acetate yarns and all animal fibers. The O. F. Zurn Co. and its textile division Quaker City Chemical, Knoxville, Tenn., exhibited a new softener and finish, Esto Wax Softener, and a new penetrant and vat assistant, Pent Lev XXX.



Technicians in new posts: Dr. Irving S. Saxl, noted textile physicist, is with E. F. Houghton & Co., Philadelphia, and Dr. Edwin A. Robinson, formerly in charge of Tennessee Eastman's development work, is with National Oil Products of Harrison, N. J.

Cleaners for Dairies Discussed

A study of cleaners in dairies was undertaken to determine the properties and efficiency for specific purposes. Cleaners studied were divided into the following classes—modified or neutral sodas, soda ash, special alkalies, trisodium phosphate, and colloidal. Aside from the trisodium phosphate, the cleaners were similar in composition.

While all of the cleaners were sufficiently soluble as ordinarily used, soda ash was the most soluble, followed by modified sodas, special alkalies, trisodium phosphate, and colloidal. Some of the cleaners were highly buffered and resistant to reduction in cleansing ability. In most cases tap water retarded this action more than distilled water. The modified sodas were most stable in buffer action, followed by soda ash and colloidal, special alkalies, and trisodium phosphate. In causticity the special alkalies were highest, trisodium phosphate 2nd, soda ash and colloidal about equal, and modified sodas lowest. For removing butterfat from a utensil by emulsification the special alkalies were most efficient, but could not be used for hand-washing because of their caustic action. Soda ash and colloidal were 2nd in efficiency in this respect, followed by modified sodas and trisodium phosphate. Soda ash was the most efficient water softener, followed in order by colloidal, modified sodas, special alkalies, and trisodium phosphate.

Cleaners containing abrasives are commonly called "detergents." Aluminum and copper were very severely scratched by the volcanic ash content of such cleaners, while tinned copper and tinned steel were severely scratched, nickel moderately scratched, and Ascoloy and chrome nickel steel were unaffected. Special alkalies were very severe in their corrosive action on metals, trisodium phosphate was 2nd in severity, soda ash 3rd, and colloidal and modified sodas were least destructive. Tinned steel was most subject to corrosion, aluminum 2nd, followed by tinned copper and copper. Nickel was but slightly affected by corrosion, and Ascoloy and chrome nickel steel appeared to be entirely resistant. While many of the cleaners had distinct disadvantages for use on metals, these objections may not hold for glassware washing. H. J. Barnum, P. S. Lucas, and B. Hartsuch, *Michigan Station Special Bul. 262* (1935), p24.

Properties of Soap Fillers

In a paper read before the German Chemical Society (*Z. angew. Chem.*, Feb. 1), Dr. Lottermoser refers to the stringent restrictions on the use of oils and fats in Germany for industrial purposes, especially soap-making, with the consequent need for the selection of suitable fillers to add to the fat charge. These limitations do not yet apply to toilet soaps, though an early extension thereof to include these is anticipated; for other classes of soap they are sufficiently drastic. In ordinary grain or curd soap the allowed maximum is 50% as compared with 63% previously, and in other kinds of soap, such as oxygen-washing preparations, soap powders and flakes, very considerable reductions in the fatty acid content have been imposed. It is considered that the fatty acid content has been reduced to the lowest tolerable limit, and in some cases possibly lower.

In the choice of suitable fillers the following are the principal conditions to be observed: (a) Their presence in the soap must not be easily detected by the user, (b) they must not prove injurious in any way to the articles washed, (c) they must not materially affect the economical use of the soap. Sodium silicate probably meets these conditions better than most fillers. Dr. Lottermoser makes a few practical suggestions as to the best methods of manufacture for silicate-filled soaps, such as the partial saponification of the fat charge only in one pan and then transfer to a 2nd pan where the silicate solution is added together with more soda and potash to complete saponification. The incorporation of the right amount of potash is of considerable importance for stability and water-holding power.

In considering the effect of silicate-filled soaps on articles in the wash, the nature of the deposits which may be formed in the fabric is discussed at some length, and various differences in these deposits, according as they are formed from the use of filled soaps or genuine soaps, are noted. It is understood that water of some degree of hardness has been used, for with soft water there would appear to be little or no risk of such deposit. If genuine soaps are used with hard water, lime salts, as is well known, are formed and are practically insoluble. A considerable deposit of these salts may be formed among the fibres of the fabric, imparting to it a greasy feel and frequently also an unpleasant smell, but not necessarily weakening the fabric. With silicate soaps the deposits are of a somewhat different kind. They may be very hygroscopic, swell easily, and, on drying, break down into dust. The objection sometimes alleged that they are frequently of a hard sharp-pointed crystalline nature, causing serious injury to the fabric, is disputed by Dr. Lottermoser, although, in the case of all such deposits, he alludes to the possible injury that may be caused to the human skin. British *Chemical Age*, March 7, '36, p216.

Soap and Perfumery Factories for Manila

Manufacture of soaps and perfumery in Manila will be undertaken by a company which has been organized by a group of Spanish-Philippino sugar interests. Company expects to begin the manufacture of perfumery within 6 months but it will require from 10 to 12 months to install the machinery for the manufacture of soap. The Philippines is an outstanding market for American toilet soaps, according to the Commerce Dept.'s Chemical Division. Shipments to that country from the U. S. aggregated 1,275,000 lbs., valued at $194,000, in '34, or more than one-fifth of the total amount of toilet and fancy soaps exported during that year.

Agricultural Specialties

Studies in the Control of the Codling Moth

Experiments on codling moth control show that the film type of coverage is more effective than a spot coverage, and that calcium caseinate is effective in forming the film coverage. It should be used in the minimum amount that will prevent formation of droplets. Larger amounts cause excessive run-off, resulting in a deposit too thin to be effective. The close association that results through the formation of the calcium caseinate in the presence of the lead arsenate and only a small amount of water may explain why the spray deposit and the control were better than in some previous tests wherein the spreader was made separately or by the tank-mix method. The addition of 1% summer oil emulsion to lead arsenate improved the control. Nicotine sulfate added to the lead arsenate-oil combination did not materially improve the control. Cryolite (sodium fluoaluminate), when used in the cover sprays, gave control on the Delicious equal to that secured with lead arsenate. The control on Rome Beauty was in some cases superior to that secured with arsenate of lead. A film coverage is more effectively removed by the acid wash than spot coverage. Oil in the spray makes the lead arsenate deposit more difficult to remove. The acid wash cannot be depended on to remove fluorine spray deposits. J. H. Newton, *Colorado State Entomology Circular* 65 (1935), p23.

New Alkaloid Base for Insecticide

In a contribution from the New Jersey Experiment Stations, J. M. Ginsburg, J. B. Schmitt, and P. Granett report on cooperative laboratory and greenhouse tests made of anabasine, an alkaloid present in the stems and leaves of *Anabasis aphylla*, of the family Chenopodiaceae, and nicotine sulfate on several species of aphids, silkworm moth larvae, grasshoppers, and honeybees. Work has shown that anabasine sulfate equals or excels nicotine sulfate in toxicity to the bean aphid, apple aphid, and the chrysanthemum aphid and is decidedly more toxic to *Rhopalosiphum rufomaculata* Wils. and the rose aphid. Anabasine sulfate was found to possess very little toxicity as a stomach poison against silkworm larvae, while nicotine sulfate proved highly toxic to it. It was decidedly less toxic to grasshoppers, applied as a stomach poison, than was nicotine sulfate. *Journal Agricultural Research*, U. S., 51, '35, No. 4, p349-354.

Fruit Cleansing Formula

Heavily sprayed waxy apples that cannot be cleaned by the usual hydrochloric acid or sodium silicate solvent treatment may be washed effectively in acid supplemented with petroleum oil. Wetting or degumming agents properly used in combination with hydrochloric acid increase the solvent action of the acid on spray residue. R. H. Robinson, Oregon Agricultural Experiment Station, Corvallis, Ore., *Industrial & Engineering Chemistry*, April, '36, p455.

Evolving HCN for Red Scale Control

Determination of the least amount of sulfuric acid which gives off an efficient yield of hydrocyanic acid gas in combating the Florida red scale is reported on by M. Shafik and A. A. Amer, *Egypt Min. Agr., Tech. and Science Service Bull.* 160 (1935), p6.

Ant Bait Available in Bulk Containers

Magikil Jelly, popular ant bait manufactured by Lethelin Products Co. of Manhasset, N. Y., is now available in bulk or drum size containers. The handy tubes may be repacked under distributer's own name.

Stauffer's New Insecticides

Stauffer Chemical Co. of Texas, 420 Lexington ave., N. Y. City, announces 2 new insecticides and fungicides, one with rotenone and sulfur and the other pyrethrum with sulfur. Company has issued a booklet describing the effectiveness of these new dusts.

Naphthalene for Greenhouse Fumigation

Naphthalene fumes will kill certain greenhouse pests, particularly the common red spider. Bulletin No. 326 of the Massachusetts Agricultural Experiment Station, Amherst, describes the work of W. D. Witcomb.

California Spray Chemical to Build

California Spray Chemical will construct a $125,000 plant at Richmond, Calif. Charles F. Andrews is the local manager. Plant now operating at Pittsburg, Calif., will be moved to Richmond.

Soil Sterilants in California

Behavior of sodium arsenite and sodium chlorate in Yolo clay loam, Stockton adobe clay, Fresno sandy loam, and Columbia fine sandy loam was studied to gain information on the merits of sodium arsenite as a soil sterilant and sodium chlorate for soil treatment, both in weed control. Compared with several soil sterilants on a cost basis, trivalent arsenic proved to be the most feasible chemical for soil sterilization. Toxicity of arsenic was greatest in Fresno sandy loam, lowest in Yolo clay loam, and intermediate in Stockton adobe clay and Columbia fine sandy loam. Loss of toxicity with time and cropping was greatest in the Yolo soil, lowest in Fresno sandy loam, and intermediate in the other two soils. Yolo clay loam had the strongest fixing power for arsenic, being able to hold over 4 times as much as Fresno sandy loam from solutions of equal concentration. Stockton and Columbia soils held somewhat over twice as much. Amount of arsenic held by all 4 soils was greater with increased concentration of the solutions applied.

Strong fixing of arsenic in the Yolo clay loam was also shown in leaching tests. After movement of 160 surface centimeters of water through the soil, the top 4 in. was still sterile, and the chemical had not gone down below the 16-in. level. Arsenic moved down through Stockton adobe clay more readily with leaching. With 160 surface centimeters of leaching, toxicity decreased in the top 4 in., but the remainder of the column was sterile. Columbia fine sandy loam was intermediate between the Yolo and Stockton soils in the leaching tests. Fresno sandy loam showed the lowest fixing power, leaching with 160 surface centimeters of water practically removing the toxicant from the soil column.

Toxicity of sodium chlorate was highest in Stockton adobe clay, lowest in Yolo clay loam, only slightly higher in Columbia fine sandy loam, and intermediate in Fresno sandy loam. Loss of toxicity with cropping was greater with the third crop than with the second, probably being related to the increasing temperature as the season advanced. The fixing power of the 4 soils was much less for chlorate than for sodium arsenite.

In Yolo clay loam more chemical was fixed from a slowly moving solution, while rate of moistening had no effect in Fresno sandy loam. The Yolo and Columbia soils could hold the chemical within the top halves of 36-in. columns from solutions up to 400 p. p. m. in concentration; in the Fresno soil it penetrated through nine-tenths of the columns. The Stockton soil apparently has no fixing power for sodium chlorate. Chlorate toxicity was higher in columns previously moistened with distilled water than in those moistened only with the chlorate solutions. Leaching with distilled water moved the chlorate downward in the soil columns, 40 surface centimeters of water sufficing to remove the chlorate from the Yolo and Columbia soils, and even less water required to leach the other 2 soils free of chemical.

Sodium chlorate was present in the top 20 in. of the soil from sterile areas sprayed 3 yr. before to kill morning-glory. Leaching with 36 surface inches of irrigation water successfully removed the chemical, and alfalfa was seeded subsequently without toxic effect apparent during the 1st year. A. S. Crafts, California Experiment Station, 9 (1935) No. 9, p461-498.

Packaging, Handling and Shipping

Metal Closures with Novel Features

Reynolds Metals, N. Y. City, reports development of a closure to overcome the annoyance and inconvenience experienced by consumers who have bought products in containers, particularly glass, and found it difficult to open them, or, having forced the closure open, have found it impossible to close it again to prevent deterioration. It is called the "Sterling Closure." It is designed to be applied by the "Sterling Capper" to the bottle or container, so that the annular bead can be compressed from .030 inch to .035 inch, which is one third more than the tolerance limits allowed as necessary in the manufacture of glass, as set up by the Glass Container Association. This compression application is positive enough to give protection and yet delicate enough to avoid unnecessary strain on the bottle, thus reducing container breakage to a minimum. The result is a package that will not leak, opens easily and can be resealed by the user with its original security.

Container to Prevent Spilling

George F. Fisher, Lake Forest, Ill., patents (No. 2,022,031) a container with a partial false bottom and partial false side wall, permitting the flow of liquid from the major portion of the container through the false bottom opening and up the side. Purpose of the design is to permit steady pouring of the liquid without the danger of spilling or slopping over. Design is interesting in the chemical field where corrosive or dangerous or expensive liquids are handled.

Design might easily be employed in the manufacture of small liquid containers where for special reasons it is particularly desirable to prevent the spilling of the contained liquid. More detailed specifications can be obtained from the complete digest of the U. S. patent.

Ketcham in Larger Quarters

Howard Ketcham, color engineer who has moved to larger quarters in the RCA Bldg., announces the organization of a design and research division for the purpose of conducting extensive international surveys to predetermine style and color preferences in commercial products.

Cardboard Can for Oil

Standard of Ohio is injecting further confusion in the bottle-can controversy by coming out with a new cardboard can for oil in 1 and 5 qt. quantities. Both American and Continental are said to have been experimenting with cardboard cans without reaching any very definite conclusion as to their ultimate ability to stand up, but the packaging field is watching developments in Ohio with keen interest. Package is made by Cleveland Lithograph Can, now a Standard of Ohio subsidiary.

Design of Packaging Machinery

"Packages and Production Machinery," by George R. Webber, packaging development bureau of Standard Brands:—"I have never seen any packaging machinery that has been made or sold by any of the well-known American producers of such equipment that has not been properly designed and properly made. Sometimes I have thought that you made it too well, and too big; sometimes I have thought that you have stressed the automatic features too much, and in selecting machinery to do certain operations, I have found it very difficult to find the middle ground between hand operation and fully automatic methods, and I think you should all keep in mind that even the big producers are not always sure that the new package or product that they are putting on the market is completely perfected, and there is a stage in nearly every new package that calls for limited production speeds, that will enable the manufacturer to put out a small quantity for test purposes, and that is where I find the greatest difficulty in selecting packaging machinery." Digest of paper delivered at the recent "Packaging Exposition."

Packaging Exposition Results in Book Form

The American Management Association, the body which sponsors the annual packaging exposition, has finally published in permanent form the results of the packaging conferences and competitions over the past 6 years. Book contains over 200 pages, sells for $7.50 and can be ordered from the Association at 330 W. 42nd st., N. Y. City.

Continuous Weighing Conveyor Scale

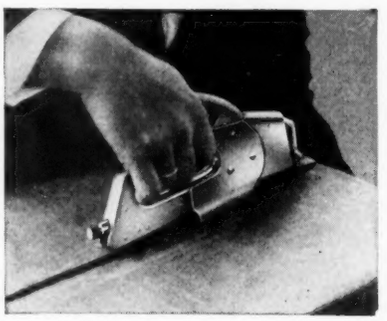
An entirely new development in a conveyor scale for continuous weighing has been announced. This unit fills a long felt need for a satisfactory method of weighing materials in transit on a belt conveyor. Machine is a complete self contained unit and is available in lengths from 8 ft. to 30 ft., with any width desired, thereby covering a wide range of capacities.

Machine to Attach Screw Caps

The Scientific Filter Co., Franklin Square, N. Y. City, manufactures a very useful and practical machine for users of screw caps of all kinds. This machine is called the S. F. Whirlwind Capper. It is a small, compact, powerful unit, with a universal current motor, designed to handle screw caps of every description and composition on any type of container. The S. F. Whirlwind is entirely practical for small vials which are difficult to cap by hand, as well as for large wide-mouthed jars. With its quick-change "tailor-made" chucks, it will handle any cap, any size, instantly, whether on bottles, jars, or cans.

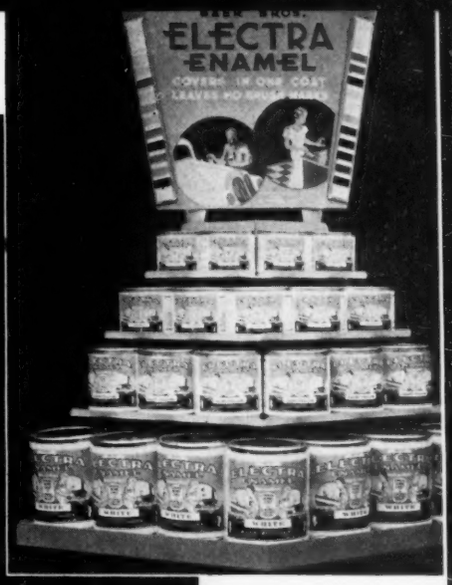
Economical Sealing of Corrugated Containers

Growing recognition on the part of business management to the importance of their shipping and packaging methods as a cost factor has led to many important cost saving developments. One of the newest of these is an inexpensive tool for sealing corrugated and fibre shipping containers, introduced by the Paslode Co., 262 N. Bank Drive, Chicago, a concern specializing in the problems of packaging and shipping. It eliminates the glue problem, speeds up sealing, produces, the manufacturer claims, a better package, reduces damage-in-transit losses. This tool is an entirely new type of stapler, called the Paslode Carton Sealer. It performs an operation that has never been done before; namely, the stapling of the flaps of any corrugated or fibre container of the overlapped type.



New Products—
New Packages

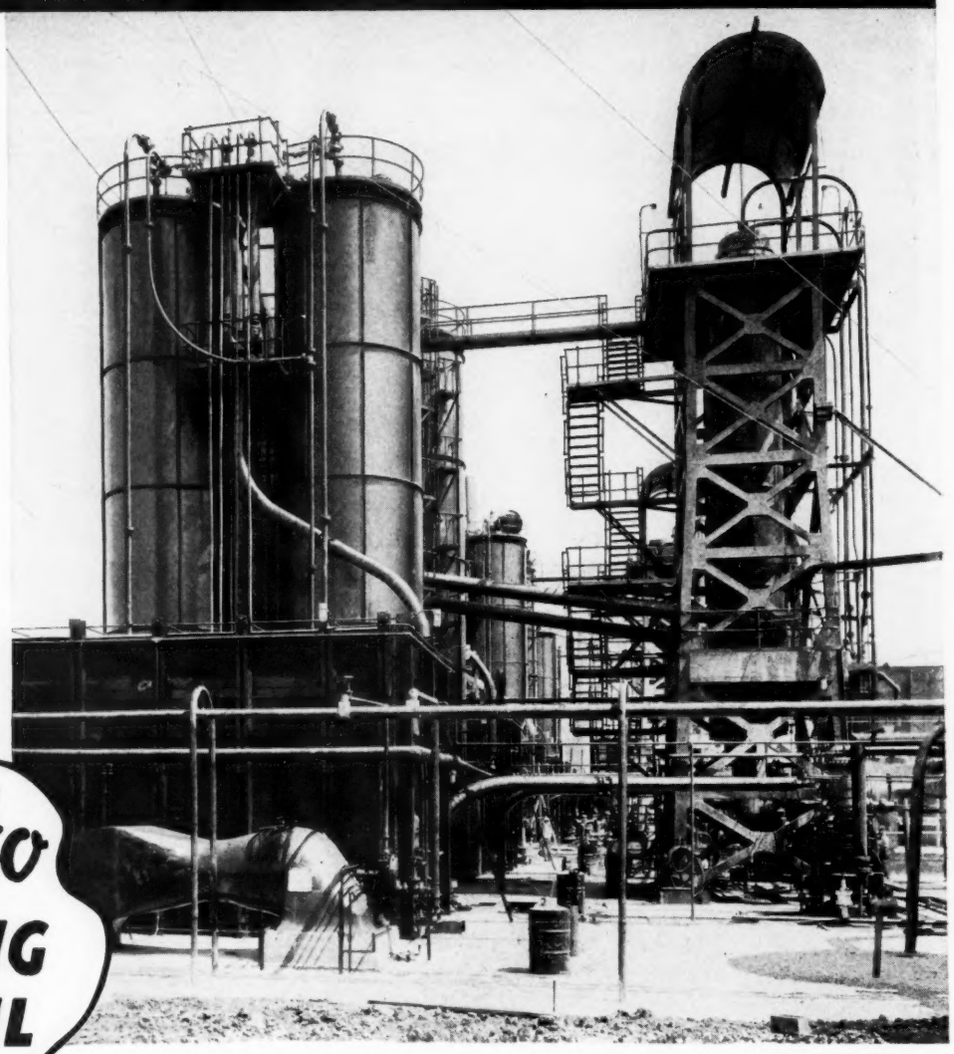
The season for white shoe polishes is at hand and two of the largest producers, Whittemore Bros. Corp., Cambridge, Mass., and the 2 in 1-Shinola Bixby Corp., controlled by the Gold Dust Corp., introduce both their liquids and creams in newly designed, attractive containers. Right, Baer Bros., N. Y. City, is promoting the sale of its Electra enamel through the use of a new display stand.



An old favorite with the housewife, Sapolio Powder (Enoch Morgan's Sons, N. Y. City) stages a sensational "comeback" with a newly designed container and a revival of the famous "Spotless Town" advertising theme.

Airbrush treatment features the redesigned packages of the insecticides produced by Dow Chemical, giving the entire line a uniform appearance. Product identification is made simple by the use of a different color background for each item in the line. Designs were originated and completed by The Fred M. Randall Company Advertising Agency, Detroit. Photograph at the right affords an excellent "before and after" contrast.

from LINING CRACKING STILLS



to REFINING SALAD OIL

PETROLEUM from well to consumer requires a number of chemicals. One of these is P. Q. Silicate of Soda. For instance, for steel cracking chambers, a lining, resistant to acid and corrosion, uses P. Q. Silicate as the binder.

Another problem in the petroleum industry was solved by using P. Q. Silicate to hasten and improve separation between solid paraffin wax and liquid mineral oil. Dirty crank case oil and dry cleaners' solvents are economically restored to usefulness by clarifying with the right silicates.

Animal, vegetable and high viscosity mineral oils are shipped in wooden containers, silicate treated to prevent absorption and leakage.

Getting down to the salad bowl, we trace the long established use of "N" Brand, Silicate of Soda as an ingredient in the vegetable oil refining process to permit higher recovery with less free fatty acid.

Have you a problem involving an oil? Maybe a P. Q. Silicate can help you.

Oil Problems solved with P. Q. Silicates:

Clarifying dry cleaners' solvent
Cleaning oil bottles and drums
Cleaning oily concrete
Cleaning oily waste
Greaseproofing paper cartons
Greaseproofing wooden containers
Oilproofing concrete
Preventing fat rancidity in soap
Reclaiming crank case oil
Sealing water-bearing strata in wells
Vegetable oil refining

PHILADELPHIA QUARTZ COMPANY EST. 1831

General Offices and Laboratory: 125 S. Third St., Philadelphia, Pa.
Chicago Sales Office: Engineering Bldg. Eight convenient plants.
Distributors in 60 cities. Sold in Canada by National Silicates Ltd., Toronto.

PQ REG. U.S. PAT. OFF.

P. Q. SILICATES OF SODA

New Trade Marks of the Month

359,364

Neozone

359,536

CURODEX

363,621

HUBTEX

368,111

ODORA

368,731

BETA

368,733

GAMMA

369,249

ALPINE
VARNISHES & PAINTS
ALPINE PAINT & VARNISH CO.

369,533

SOL-KLEAN

370,174

370,360

370,497

THE M D 1893 CO

371,147

DURA LUSTRE

372,086

SENTINEL

371,562

Tomasphalt

372,681

372,682

NABICO
RUSTNIL

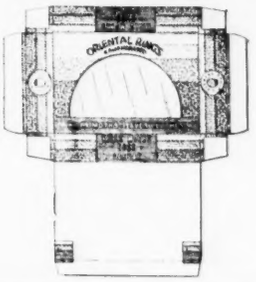
372,832

HERCULES
ZINC
SULPHIDE

373,051

PERMAPLASTIC

372,977



Trade Mark Descriptions†

359,364. Neo-Aire, Inc., N. Y. City; filed Dec. 15, '34; for air treating fluid; use since Oct. 25, '34.

359,536. W. J. Bush & Co., N. Y. City; filed Dec. 21, '34; for deodorizers for rubber products; use since Oct. 19, '34.

363,621. Boston Putty Works (Hub Paint Co.), Boston, Mass.; filed Apr. 11, '35; for wall texture paint; use since May 9, '34.

368,111. Odora Co., N. Y., City; filed Aug. 8, '35; for dry cleaning fluids; use since Mar. '29.

368,731. Angelo Bros. Ltd., Calcutta, India; filed Aug. 27, '35; for prepared shellacs and lacs; use since June '33.

368,733. Angelo Bros. Ltd.; filed Aug. 27, '35; for prepared shellacs and lacs; use since June '33.

369,249. A. Sklar & Sons, Inc. (Alpine Paint & Varnish), Yonkers, N. Y.; filed Sept. 12, '35; for ready-mixed paints and varnishes; use since Jan. 1, '35.

369,533. Industrial Chemical Products, Detroit; filed Sept. 20, '35; for fabric and household cleaner; use since '30.

370,174. Creco Co., Long Island City, N. Y.; filed Oct. 9, '35; for cleansers; use since Aug. '32.

370,360. Peninsular Paint & Varnish, Detroit; filed Oct. 14, '35; for paints, polishes, stains, etc.; use since Sept. 1, '35.

370,497. Martin Dennis Co., Newark, N. J.; filed Oct. 18, '35; for chemicals used in leather tanning; use since Apr. 1, '35.

371,147. Floor Maintenance Bureau, Newark, N. J.; filed Nov. 4, '35; for woodwork polishes; use since Sept. 1, '35.

372,086. Cliffs Dow Chemical; filed Nov. 29, '35; for anti-freeze materials; use since Oct. 4, '35.

371,562. Samuel J. Tomasello, Dorchester, Boston, Mass.; filed Nov. 14, '35; for bituminous asphalt paving material; use since Aug. 1, '35.

372,681. National Boiler Improvement Co., Washington, D. C.; filed Dec. 16, '35; for plastic gasket and pipe thread compounds; use since Nov. 15, '35.

372,682. National Boiler Improvement Co., Washington, D. C.; filed Dec. 16, '35; for metal paints; use since Oct. 22, '35.

372,832. Hercules Powder; filed Dec. 19, '35; for powdered zinc sulfide as paint base; use since Nov. 12, '35.

373,051. Permastic Ltd., New Haw, England; filed Dec. 24, '35; for phenol-formaldehyde molding materials; use since Oct. 27, '35.

372,977. Lewy Chemical; filed Dec. 23, '35; for moth killer; use since Dec. 13, '35.

One million knives given away as premiums brought sales of 2 million cans of Sunbrite Cleanser to Swift & Co., maker.

Chemical Specialty Patents*

Method of treating paper to be used as toweling, etc., comprising dipping the paper into solution of glue and a tanning agent. No. 2,035,024. Milton O. Schur to Brown Co., both of Berlin, N. H.

Production of briquettes and wall-boards for heat and electrical insulating purposes by incorporating asphaltenes with binder and fibrous materials. No. 2,035,122. Stewart C. Fulton, Elizabeth, and Vladimir Kalichevsky, Gloucester, N. J., to Standard Oil Development Co., a corp. of Del.

Defrosting brick for anti-freeze purposes made by mixing sodium chloride, alcohol, glycerine, creosote, ginger and hemlock oil with sawdust, and forming the mixture into bricks by compression. No. 2,035,219. Gilbert A. Booth, North Adams, Mass.

Finely intermixed composition comprising sodium perborate, essential oils, and sodium bicarbonate, each particle being coated with a stearate-essential oils coating, all mixed with tartaric acid particles coated with colloidal clay. No. 2,035,267. Philip Fleischman; one-tenth to Louis Schumacher, both of N. Y. City.

Production perfumed detergent materials by forming bisulfite compounds of aldehyde and ketone perfume materials and adding this compound to an alkaline detergent which will liberate the perfume upon addition of water. No. 2,035,494. Walter Christian Meuly, New Brunswick, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Fireworks composition consisting of 36 to 40% barium nitrate, 6 to 8% strontium nitrate, 50 to 54% magnesium and 2 to 4% paraffin. No. 2,035,509. George J. Schladt, Dover, N. J.

Working fluid for absorption refrigerating machines comprising a di-ester as absorbent and a halo-fluoro derivative of an aliphatic hydrocarbon as refrigerant. No. 2,035,541. Joseph Fleischer, Dayton, Ohio, to General Motors Corp., a corp. of Del.

Insecticide paste for killing boring insects comprising colloidal clay, an insecticide, ethyl alcohol, and enough water to form the paste. No. 2,035,546. Clyde C. Hamilton, Highland Park, N. J., to Endowment Foundation, New Brunswick, N. J.

Can sealing composition comprising latex base mixed with a gummy and stringy resinous substance and reaction product of glycerin and boric acid. No. 2,035,601. Julius H. Haines, Brooklyn, N. Y.

Sheet base material comprising a synthetic veneer adhesively united to a base. No. 2,035,761. Thomas S. Reese, Cleveland.

Wetting agent for treating cotton fabrics and yarns comprising an alkaline mercerizing solution and mixture of iso-amyl alcohol and a phenol. No. 2,035,894. Leopold Kahl, Berlin-Charlottenburg, Germany, to Ruetgerswerke-Aktiengesellschaft, Berlin, Germany.

Production building material comprising fibrous body covered with bituminous waterproofing material. No. 2,035,921. Robert G. Quinn, Glens Falls, N. Y., to International Paper Co., N. Y. City.

Production scouring detergent paste composed of 14 to 52% liquid kerosene in solution of oil-miscible organic emulsifying agent and 48 to 86% solid abrasive. No. 2,035,940. John K. Berresford, Pelham Manor, N. Y.

Production asphalt paving composition. No. 2,036,130. James William Fraser, Cleveland.

Wax composition in which the brittleness of oil-free petroleum wax is decreased by adding small amount of rubber. No. 2,036,301. Henry J. Rose to The Atlantic Refining Co., both of Philadelphia.

Process treating bags used to carry fertilizers such as superphosphates, mixed, etc., by impregnating unfilled bag with sodium carbonate solution. No. 2,036,357. Levi Jack Pettett, Lockland, Joseph Reese Brown, Wyoming, and Harold Newcombe Mills, Cincinnati, Ohio.

Moisture-proof wrapping paper containing wax dispersed therein, and coated with a composition comprising nitrocellulose, a water-immiscible plasticizer, and a resin. No. 2,036,392. Leonard E. Branchen and George R. Clark to Eastman Kodak Co., all of Rochester, N. Y.

Washing, cleaning, wetting and emulsifying agent comprising a water-soluble soap, an oxygenated organic, water, and an aromatic hydrocarbon solvent. No. 2,036,438. Walter Schrauth,

(Specialty Patents continued on next page.)

* Patents covered in this issue include those appearing in the *U. S. Patent Gazettes*, Mar. 24 to Apr. 21.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, Mar. 24 to Apr. 21.

Specialty Patents (Continued)

Berlin-Dahlem, Germany, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Ink transfer media composed of fibrous base, a pigmented oleaginous vehicle, and an anti-oxidizing phenolic compound. No. 2,036,471. Paul H. Gill, Belmont, Mass., to The Gill Corp., Cambridge, Mass.

Printing ink free of benzene hydrocarbons containing 95 parts by weight of volatile liquid paraffin hydrocarbon and 3 to 8 parts of ethers or esters of a miscible aliphatic compound having chain of 3 to 7 carbon atoms. No. 2,036,480. Felix Kaufler and Hilger Peter Schmitz to Dr. Alexander Wacker Gesellschaft for Elektrochemische Industrie, all of Munich, Germany.

Production fertilizer compositions comprising a solution of ammonium nitrate and calcium nitrate in an ammoniacal liquid. No. 2,036,481. Walter H. Kniskern, Petersburg, Va., and Leonard V. Rohner, Syracuse, N. Y., to Atmospheric Nitrogen Corp., N. Y. City.

Envelope for gas cells consisting of homogeneous mixture of organic cellulose derivative and a compound from the group gelatin, glue, and casein. No. 2,036,526. Max Hagedorn and Adolf Jung, Dessau in Anhalt, Germany, to I. G., Frankfort-am-Main, Germany.

Photographic filter layers comprising a binding agent, and a dye decolorizable in developing solutions. No. 2,036,546. Wilhelm Schneider, Dessau in Anhalt, Germany, to Agfa Ansco Corp., Binghamton, N. Y.

Production resinous materials suitable for use in compounding chewing gum. No. 2,036,577. George A. Hatherell, Roscoe, Cal., to Frank A. Garbutt, Los Angeles.

Shoe stiffener comprising a fibrous base impregnated with nitrocellulose and boric acid interspersed therein. No. 2,036,588. Stanley P. Lovell, Newton, Mass., to Beckwith Mfg. Co., Dover, N. H.

Production solid fuel briquette composed of 100 parts by weight petroleum coke fines, 4 to 6 parts crushed rosin, 5 to 7 parts by weight fuel oil and 1½ to 2½ parts hydrated lime. No. 2,036,642. Frank Paul Pukli, El Paso, Tex.

Printing ink consisting of solution containing rubber, cellulose ester; a solution of rubber, cellulose ester, and a dye; and a miscible solvent thinner for rubber and cellulose ester comprising 2 parts butyl alcohol, 2 parts toluol, one part methyl-ethylene-glycol and one part tetrahydronaphthalene. No. 2,036,768. Herbert Newall Morris, Broxbourne, England, to Rucel Ltd., London, England.

Metal cleansing composition composed of a grease solvent, a saponifiable oil, and an alkaline saponifying agent. No. 2,036,848. Frank Armour, East Rutherford, and George C. Reinhard, Wood-Ridge, N. J., to American Colloid Corp., N. Y. City.

Process for fireproofing organic cellulose derivative textile materials by applying weighting treatment and then applying a halide of a volatile base and either a phosphate or a borate of a volatile base. No. 2,036,854. William Alexander Dickie and Frank Brentnall Hill, Spondon, near Derby, England, to Celanese Corp. of Am., a corp. of Del.

Insulating material composed of plastic fatty clay, milled paper, sawdust and bast fibres. No. 2,036,877. Johannes Leppik, Nomme, Tallinn, Estonia, to Telsit Insulation Corp., N. Y. City.

Complex phenolic soap containing formaldehyde and a strongly basic non-aromatic secondary amine. No. 2,036,916. Herman A. Bruson to Rohm & Haas Co., both of Philadelphia.

Continuous production of soap directly from saponifiable material by reaction with aqueous solution of a saponifying reagent. No. 2,037,006. Benjamin Clayton, Sugarland, Tex., to Refining, Inc., Reno, Nev.

Production of adhesive composed of nitrocellulose, Gum dammar, monomethyl ether of ethylene glycol, ethyl lactate and ethanol. No. 2,037,053. James E. Snyder, Kenmore, and Theron G. Finzel, Buffalo, N. Y., to Du Pont Cellophane Co., N. Y. City.

Dusting fungicide consisting of sulfur free from pellets and containing small amount of carbon. No. 2,037,090. Francis H. Plough to Southern Acid & Sulphur Co., both of St. Louis, Mo.

Method of treating friction fabric by subjecting to heated bath containing castor oil, rosin, gilsonite selects, red lead, Chinawood oil, and a thinner. No. 2,037,189. Julius W. Abernethy, Sidney J. Smyer, and Alfred B. Kuhn, Newton, N. C.

Production of concentrated insecticide spray material by treating tobacco extract with sulfuric acid to form nicotine sulfate, concentrating the liquid and mixing with fatty acid. No. 2,037,276. Carl Sgonina, Henderson, Ky.

Air drying imitation leather finish composition composed of a synthetic varnish resin, a natural resin varnish, raw Chinawood oil, and a drier consisting of linoleates of cobalt, lead and manganese. No. 2,037,331. Harvey G. Kittredge and Albert J. Turner to The Kay & Ess Chemical Corp., all of Dayton, Ohio.

(*Specialty Patents concluded on next page.*)

372,859
SHOE PRESS

372,976
ORIENTAL

373,243
Bishop's
EEZ-ON

373,285
SUNSO

373,303
MATCH-BOX

373,552
ACTOLITE

373,559
TOXICOL

373,586
ANOCO

373,612
FLAT-KI

373,709
JOPMO

373,710
VEROX

373,931
NITROCOL

373,983
SWEET MUSIC

374,027
ZIALITE
NON-STRIKE NICKEL PLATING SOLUTION FOR ZINC

374,089
SAS
SHINE -A- STINE

374,097
Motesso

374,103
CHATEAU

374,236
eternol

374,255
Six 20 Six

374,257
KIANITH

374,283
DORMAPHEN

374,373
GOLDEN SUN

374,424
AMMONIATED BENZAMO

374,425
Gas-O-Cide

374,426
GYMLOH

374,427
GERMOLYPTUS

374,450
APEX

374,470
JACK AND JILL

374,473
SILVATISH

Descriptions

372,859. Shoe Press Corp., Philadelphia; filed Dec. 19, '35; for bottom finish for shoes and solvent to prepare shoe bottoms for re-soling; use since Nov. '34 on solvent, Sept. 30, '35, on bottom finish.

372,976. Lewy Chemical, N. Y. City; filed Dec. 23, '35; for moth killer; use since Dec. 13, '35.

373,243. Edward C. Bishop (Eez-On Products), Campgaw, N. J.; filed Jan. 2, '36; for wax polish; use since Aug. 20, '35.

373,285. Cunningham Cleanser Corp., N. Y. City; filed Jan. 2, '36; for washing and scouring powders, paste soap, and soapless detergents; use since June 9, '25.

373,303. International Printing Ink; filed Jan. 3, '36; for printing inks; use since Dec. 11, '35.

373,552. Walter S. Baylis, Huntington Park, Cal.; filed Jan. 11, '36; for activated earth used in lubricating oil treatment; use since Dec. 17, '35.

373,559. A. D. Chapman & Co., New Orleans; filed Jan. 11, '36; for wood preservative; use since Dec. 13, '35.

373,586. American Oil, Baltimore; filed Jan. 13, '36; for naphtha; use since July 1, '31.

373,612. Mengel Co., Louisville, Ky.; filed Jan. 13, '36; for wood veneer; use since Dec. 24, '35.

373,709. Eagle-Picher Lead, Cincinnati; filed Jan. 15, '36; for refractory bricks and cement, etc., use since Jan. 1, '35.

373,710. Eagle-Picher Lead; filed Jan. 15, '36; for refractory bricks and cement, etc.; use since Jan. 1, '35.

373,931. C. J. Osborn Co., N. Y. City; filed Jan. 21, '36; for cellulose esters, plasticisers, pigments, etc.; use since Dec. 13, '32.

373,983. M. Werk Co., St. Bernard, Ohio; filed Jan. 22, '36; for soap; use since Jan. 6, '36.

374,027. Tuttle Chemical, N. Y. City; filed Jan. 23, '36; for electro-plating chemical; use since July 20, '31.

374,089. Marie R. Miller (The Walter Miller Co.), Indianapolis; filed Jan. 25, '36; for sterilizer, deodorant, disinfectant and beer coil cleaner; use since Oct. 16, '35.

374,097. Standard Oil of N. J.; filed Jan. 25, '36; for hydrocarbon gases; use since Dec. 12, '35.

374,103. U. S. Gypsum, Chicago; filed Jan. 25, '36; for asphalt shingles; use since July, '34.

***374,236.** Eterne Mfg. Corp., N. Y. City; filed Jan. 29, '36; for liquid soap; use since May 31, '34.

374,255. Sherwin-Williams; filed Jan. 29, '36; for paints and paint materials; use since Apr. 8, '35.

374,257. Tennessee Mineral Products, N. Y. City; filed Jan. 29, '36; for kyanite; use since Jan. 10, '36.

374,283. Calco Chemical; filed Jan. 30, '36; for mechanical mixture of magnesium phenobarbital and phenacetin; use since Dec. 24, '35.

374,373. Joseph Mendelbaum (Golden Sun Chemical), N. Y. City; filed Feb. 1, '36; for polishes, soaps, etc.; use since Sept. '35.

374,424. Midland Chemical Laboratories; filed Feb. 3, '36; for dry cleaning paste soap; use since June 7, '26.

374,498

TUXITE

374,532

MOONSHEEN

374,550

Startling

374,554

EAGLE

374,557

GLITTER SUPER CLEANER

374,558

GLITTER SUPER GLAZE

374,572

SHERWIN-WILLIAMS M-S Brighten Up WHITE

374,583

Rubinol

374,584

ADMIRAL

374,585

CADET

374,586

KOLORGRAN

374,604

Maid of Honor

374,614

Co-Val-U

374,615

Co-Val-U

374,616

Co-Val-U

374,655

Hy-Valu

374,656

Hy-Valu

374,671

CALZA

374,680

CELLOFILM

374,712

DITZCO

374,726

REPELEX

374,742

ULTRAWET

374,848

POLYSHINE

Descriptions

374,425. Midland Chemical Laboratories, Dubuque, Iowa; filed Feb. 3, '36; for food insecticide used in flour mills; use since Feb. 2, '31.

374,426. Midland Chemical Laboratories; filed Feb. 3, '36; for combined varnish filler and surface material for gymnasium floors; use since Nov. 13, '31.

***374,427.** Midland Chemical Laboratories; filed Feb. 3, '36; for germicide, disinfectant, antiseptic and deodorant; use since Dec. 15, '32.

374,450. Apex Color Works, N. Y. City; filed Feb. 4, '36, (10 year proviso); for ready mixed paints and paint materials; use since 1874.

374,470. Miami Products & Chemical, Dayton, Ohio; filed Feb. 4, '36; for concentrated liquid bluing and ammonia cleaner; use since Oct. 1, '34.

374,473. Novelart Mfg., N. Y. City; filed Feb. 4, '36; for treated tissue paper for polishing silverware; use since Jan. 29, '36.

374,498. Tuxite, Inc., N. Y. City; filed Feb. 4, '36; for silk preservative powder; use since Aug. 1, '35.

374,532. Schuylkill Chemical, Philadelphia; filed Feb. 5, '36; for peroxide; use since '28.

374,550. Martin J. Cabana, Inc., Buffalo; filed Feb. 6, '36; for automobile or furniture polish and cleaner; use since Feb. 4, '36.

374,554. Eagle-Picher Lead, Cincinnati; filed Feb. 6, '36; for paint materials; use since Nov. 15, '26.

374,557. Glitter Products, Detroit; filed Feb. 6, '36; for automobile body cleaner; use since Dec. 7, '35.

374,558. Glitter Products; filed Feb. 6, '36; for polishing material; use since Dec. 7, '35.

374,572. Sherwin-Williams; filed Feb. 6, '36; for paints, lacquers, varnishes, stains, etc.; use since May 1, '15.

374,583. Harold H. Fries (Fries Bros.), N. Y. City; filed Feb. 7, '36; for photographic developer; use since Apr. 10, '35.

***374,584.** Globe Roofing Products, Chicago; filed Feb. 7, '36; for asphalt composition roofing and building papers; use since Dec. '35.

***374,585.** Globe Roofing Products; filed Feb. 7, '36; for asphalt composition roofing and building papers; use since Dec. '35.

374,586. Globe Roofing Products; filed Feb. 7, '36; for asphalt composition roofing and building papers; use since Oct. '35.

374,604. Sears, Roebuck, Chicago; filed Feb. 7, '36; for polishes; use since '29 on polish and '34 on wax.

374,614. Con-Ferro Paint & Varnish, St. Louis, Mo.; filed Feb. 8, '36; for paints and varnishes; use since Jan. 3, '36.

374,615. Con-Ferro Paint & Varnish; filed Feb. 8, '36; for quick dry paint enamels; use since Jan. 3, '36.

374,616. Con-Ferro Paint & Varnish; filed Feb. 8, '36; for ready mixed paints, driers, etc.; use since Jan. 3, '36.

374,655. Con-Ferro Paint & Varnish; filed Feb. 10, '36; for varnish stain; use since Jan. 2, '36.

374,656. Con-Ferro Paint & Varnish; filed Feb. 10, '36; for ready mixed paints, enamels, and prepared shellac; use since Jan. 2, '36.

* Trade-marks from *Patent Gazette* of Mar. 17.

Specialty Patents (Concluded)

Fumigant composition for destroying pests and germs, composed of alkylene oxides dissolved in liquid carbon dioxide under pressure. No. 2,037,439. Hans Schrader and Erwin Bossert, Essen-Ruhr, Germany, to Union Carbide & Carbon Corp., a corp. of N. Y.

Cleaner for tin, zinc and aluminum surfaces composed of approximately 63 parts trisodium phosphate, 10 parts sodium perborate, 25 parts sodium silicate, and 2 parts magnesium sulfate. No. 2,037,566. Charles B. Durgin, Anniston, Ala., to Swann Research, Inc., a corp. of Ala.

Parasitical spray material comprising reaction products of zinc-lime and lime-sulfur. No. 2,037,656. John W. Roberts, Washington, D. C., dedicated to the free use of the Government and people of U. S. A.

Addition of zinc-lime to arsenical plant sprays thus rendering them non-injurious. No. 2,037,657. John W. Roberts, Washington, D. C., dedicated to the free use of the Government and people of U. S. A.

Plant spray comprising zinc nitrate and lime. No. 2,037,658. John W. Roberts, Washington, D. C., dedicated to the free use of the Government and people of U. S. A.

Preparing metal plates for photolithography by graining in presence of solution containing gum arabic and hydrofluoric acid. No. 2,037,716. John G. Goedike, San Antonio, Tex.

Photographic developer comprising a solution of an alkyl substituted pyrogallol. No. 2,037,742. Fritz E. Stockelbach, Montclair, N. J.

Sealing composition comprising colloidally fine particles of hardened rosin ethyl abietate, filler particles, and a volatile liquid containing a pentizer. No. 2,037,913. Frederic A. Madenwald and Norman J. Beno, Chicago, to Continental Can Co., N. Y. City.

Acoustical plaster composition containing 8 to 10 parts stucco, 8 to 10 parts slag, .8 to 1.1 parts asbestos shorts, .8 to 1.1 parts exfoliated vermiculite, small amount of retarder and .15 to .25 parts soap bark. No. 2,037,995. Gustave Adolph New to John E. Rooney, both of Cleveland.

Sand finish hard surface acoustical plaster containing by weight 600 to 900 parts stucco, 250 to 300 parts asbestos shorts, 100 to 250 parts expanded lithic filler, 15 to 25 parts soap bark, and 3.5 to 4.5 parts retarding agent. No. 2,037,996. Gustave Adolph New to John E. Rooney, both of Cleveland.

Cement cork shingle containing also a small amount fibrous material. No. 2,038,106. Norman P. Harshberger, Scarsdale, N. Y., to The Barrett Co., N. Y. City.

Under water cement and mortar comprising an intimate mixture of high alumina hydraulic cement with a water-insoluble bentonite binder. No. 2,038,160. Howard J. Billings, South Acton, Mass., to Arthur D. Little, Inc., Cambridge, Mass.

Photographic emulsion comprising gelatin, silver nitrate, a halide of rubidium, halide of caesium, chromous hydroxide, and thallium hydroxide. No. 2,038,307. Orry Charles Morrison, Carroll, Iowa.

Production of a pattern on drawing paper by forming pattern with mercurous chromate, forming a 2nd pattern with lead chromate, and then treating paper with hydrogen chloride and soluble bisulfate to convert lead salt to the sulfate and thus bring out the pattern. No. 2,038,516. Maurice D. McIntosh, Marion, Kans., to Louis S. Sanders, Cleveland.

374,671. I. F. Laucks, Inc., Seattle; filed Feb. 10, '36; for hot and cold water calcimine; use since Feb. 1, '36.

374,680. Louise Chalkley Given (The Cello Co.), New Hope, Pa.; filed Feb. 10, '36; for polishes; use since Jan. 27, '36.

374,712. Ditzler Color, Detroit; filed Feb. 11, '36; for liquid and paste paints, primers, enamels and lacquers; use since Jan. 1, '23.

374,726. Multigraph Co., Cleveland and Wilmington; filed Feb. 11, '36; for solutions making printing plates grease and ink repellant; use since May '34.

374,742. Atlantic Refining, Philadelphia; filed Feb. 12, '36; for wetting agents; use since Feb. 3, '36.

374,848. Polyshine, Inc., Rochester, N. Y.; filed Feb. 14, '36; for liquid and paste shoe polish; use since Aug. 12, '26.

Jap Pyrethrum Exports

Japan's exports of pyrethrum flowers attained a peak of 16,897,500 lbs. last year compared with 12,416,000 during '34 and only 11,220,000 in '33. Japan is the chief world source for this important insecticide material and the U. S. is the outstanding market, taking approximately 95% of the total Japanese exports last year.

374,744

375,267

371,148

DURA LIFE

374,835

VAPORIN

375,314

EMLAC

371,446

374,860

GOYESCA

375,315

Liquid Wall Paper

373,493

EASTER BUNNY

374,872

375,500

SILVERLAST

373,769

ATOMAL

361,826

374,986

Sandra

373,846

KLEINITE

373,847

MOLITE

374,989

A-B TEX

373,898

DURACAL

368,324

Févon

374,452

PREFERRED

374,990

KAL

370,603

374,555

VERCEL

375,183

Pli Phane

374,629

FLO-SHEEN

373,019

CCR

375,263

CHYPRON

374,960

REVERBOLITE

Descriptions

374,744. Con-Ferro Paint & Varnish; filed Feb. 12, '36; for quick dry paint enamels; use since Jan. 2, '36.

374,835. International Printing Ink; filed Feb. 14, '36; for printing ink; use since Jan. 23, '36.

374,860. Societe Anonyme Myrurgia, Barcelona, Spain; filed Feb. 14, '36; for soaps; use since Sept. '19.

374,872. Bon Ami, N. Y. City; filed Feb. 14, '36; for polishing and cleaning powder; use since '13.

374,986. Shulton, Inc., N. Y. City; filed Feb. 18, '36; for soaps in various forms; use since Oct. 31, '35.

374,989. U. S. Gypsum, Chicago; filed Feb. 18, '36; for plastic wall paint; use since Nov. '35.

374,990 U. S. Gypsum; filed Feb. 18, '36; for plastic wall paint; use since Nov. '35.

375,183. Watson-Standard, Pittsburgh; filed Feb. 24, '36; for varnish; use since May 15, '35.

375,263. Ferd Muhlens, Inc., N. Y. City; filed Feb. 26, '36; for various type soaps; use since Jan. 27, '36.

375,267. Papermakers Chemical, Wilmington, Del.; filed Feb. 26, '36; for chemical resistant paint; use since Jan. 30, '36.

375,314. Ault & Wiborg, Cincinnati; filed Feb. 28, '36; for lacquer emulsion; use since Jan. 4, '36.

375,315. Charles Barrell (Charles Barrell, Manufacturing Chemist), Hollis, N. Y.; filed Feb. 28 ,'36; for ready mixed paste paint; use since May 1, '34.

375,500. Emerson Glass Corp., Jamestown, N. Y.; filed Mar. 3, '36; for metallic protecting paint used on mirror backs; use since Oct. 17, '34.

361,826. Luther M. Terrell (Terrell Belt Dressing Mfg. Co.), Gadsden, Ala.; filed Feb. 25, '35; for belt dressing; use since Dec. 26, '34.

368,324. Bohme Fettchemie-Gesellschaft m. b. H., Chemnitz, Germany; filed Aug. 15, '35; for soap, bleaches, and cleaners; use since Apr. 27, '35.

370,603. Dow Chemical; filed Oct. 21, '35; for disinfectant and antiseptic preparations; use since May 22, '35.

373,019. Canadian Copper Refiners, Toronto, Ontario, Canada; filed Dec. 24, '35; for refined copper, silver, selenium and tellurium; use since May 12, '31 to Nov. 3, '34, on various metals.

371,148. Floor Maintenance Bureau, Newark, N. J.; filed Nov. 4, '35; for cement and terrazzo finish for floors, woodwork, furniture, etc.; use since Sept. 1, '35.

371,446. Otto Eugen Schniebs (Otto Schniebs Co.), Hanover, N. H.; filed Nov. 11, '35; for wax polish used on skis; use since May 15, '35.

373,493. Fred Fear & Co., Brooklyn; filed Jan. 9, '36; for easter-egg dyes; use since Dec. 23, '35.

373,769. Agfa Ansco, Binghamton, N. Y.; filed Jan .21, '36; for photographic chemicals; use since Dec. 31, '35.

373,846. Turner & Seymour Mfg., Torrington, Conn.; filed Jan. 18, '36; for cast iron alloy; use since Oct. 28, '31.

373,847. Turner & Seymour Mfg.; filed Jan. 18, '36; for cast iron alloy; use since May 31, '32.

373,898. U. S. Gypsum, Chicago; filed Jan. 20, '36; for dry plastic cold water paint; use since Jan. '35.

374,452. Bird-Archer Co., N. Y. City; filed Feb. 4, '36; for preparation preventing and removing soot and fire scale from boilers; use since July 1, '33.

374,555. Eagle-Picher Lead; filed Feb. 6, '36; for refractory and insulating material; use since Jan. 1, '35.

374,629. Norfolk Paint & Varnish, Quincy, Mass.; filed Feb. 8, '36; for ready-mixed paint; use since Nov. 25, '35.

374,960. American Gypsum, Port Clinton, Ohio; filed Feb. 18, '36; for acoustical plaster; use since Oct. 19, '29.

California Labeling Problems

Problems of the flyspray and insecticide industry with regard to proper labeling of preparations containing rotenone or pyrethrins were discussed by representatives of insecticide companies, entomologists and State and Federal officials in San Francisco on Apr. 6th. Dr. Alvin J. Cox, chief of the State chemistry division, presided.

Recognizing the present difficulty of exact analysis of pyrethrins 1 and 2 in flysprays and recognizing also the need of suitable methods of labeling so that the ultimate consumer can know what a flyspray contains, Dr. Cox appointed a committee of 5 to make an investigation and report later.

With respect to sprays containing rotenone, a resolution was passed at the meeting requesting the U. S. Food and Drug Administration and the State department of agriculture to allow the term "Derris and/or Cube Root," in designating the source of rotenone, rather than to specify one or the other root singly. Shifting market prices on the 2 roots sometimes made it impracticable to use one or the other solely for a definite period of time in manufacturing processes, it was said, and a more flexible statement on the label was sought.

Stinson Dies at 80

Benjamin Franklin Stinson, 80, founder and for nearly 50 years active head of the Stinson Co., manufacturer of shoe polish and stove polish, died April 18th in Buffalo. Mr. Stinson founded the enterprise on a small scale and continued its expansion until he retired at the age of 70, disposing of his interests to the Prescott Co.

P. & G. Acquires Company

P. & G., through its Dayton subsidiary, Hewitt Soap, acquires major part of the business and assets of Cincinnati Soap, a privately owned manufacturer of bulk and private label soaps. Price is understood to be under $500,000. Cincinnati Soap, whose plant is in Dayton, has large contracts with chain stores and other national outlets. Officials of the company will continue in business as the Grandpa Soap Co., making a pine tar soap carrying that name.

CHEMICAL NEWS & MARKETS

Francis P. Garvan, who presides this month over the second meeting of the Farm Chemurgic Council.

You never expected THIS....!

WHEN, long years ago, you lingered at the crossing to see the Limited whiz by, you never thought that some day it would look like the flyer pictured above.

The industries, like the railroads, are constantly seeing changes and new, unexpected developments.

In these changes chemistry plays an important rôle. New achievements—new short cuts—new important economies—are being made with the help of industrial chemicals.

You, as a user of such chemicals, need an up-to-the-minute source of supply—where ideas, as well as merchandise, are available.

We offer you the sum of 120 years' first-hand experience in producing and distributing chemicals, and applying them to the practical solution of industrial problems.

When you need industrial chemicals, call on us. You'll find us a friendly organization, as well as a useful one.

Why not let's get better acquainted? You can't lose—and you may gain **much!**

CAUSTIC POTASH

Solid—Fused 88-92%. Drums 550-700 lbs.
Liquid-Baume 45°. Tank Cars. Drums 675 lbs.
Flake—Ground. Drums 100-225-550 lbs.
Walnut Size. Drums 100-225-550 lbs.

CARBONATE OF POTASH

Calcined, 80/85%, 96/98%, Dustless, 98/100%.
Highly refined, 99/100%.
Liquid, Water-White, Sparking Clear, guaranteed minimum of 47% K_2CO_3.

CHLORIDE OF LIME

35-37% (Bleaching Powder). Drums 100-300-850 lbs.

CAUSTIC SODA

Solid—Fused 76%. Drums 700 lbs.
Flake—76%. Drums 125 and 400 lbs.
Crystals and Ground. Bbls. 500 lbs. Drums 400 lbs.
Liquid—Basis 76%.
Drums 675 lbs. and Tank Cars.

IRON CHLORIDE

C. P. Lumps. Bbls. 500 lbs.

SULPHUR CHLORIDE

Drums and Tank Cars.

MILLED GUMS and REFINED WAXES

New equipment in our Jersey City plant puts us in position to serve you to advantage on Granulated Gum, Arabic and Karaya, Grained Gum in all meshes, freed from powder and bark . . . . also Refined Beeswax, Ceresine Wax and Carnauba Wax.

INNIS, SPEIDEN & CO.

Industrial Chemicals since 1816

117-119 Liberty Street • New York

CHICAGO • PHILADELPHIA • BOSTON • CLEVELAND • GLOVERSVILLE, N. Y.

Factories: NIAGARA FALLS, N. Y., *and* JERSEY CITY, N. J.

ASKS FERTILIZER INVESTIGATION

Domestic Potash and Fertilizer Industries Objects of Possible Probes—Allied Annual Meeting Quiet Affair—A. C. S. Hears "Pro and Con" of Alcohol-Gasoline Blends—Fertilizer Industry Experiments with Self-Government Plan—

Domestic potash industry would be investigated by the Committee on Public Lands and Surveys, in a resolution offered Apr. 1st by Senator Pittman. Resolution alleges that following the development of additional sources of potash in Spain, Russia, the Dead Sea, and the U. S., the German Kali Syndicate temporarily lost its power to maintain world prices. After this breakdown, the Searles Lake producer, American Potash & Chemical, quoted muriate at $22.00 per (short) ton as compared with a price of about $34.50 maintained since '21. In May, '35, a marketing agreement was entered into between the German Syndicate and the Spanish producers, and in July, '35, a more effective system of export subsidization by the German Government was begun.

Resolution also alleges that a Potash Institute was organized in Washington in May, '35, by domestic producers and importers of potash salts, and that about that time the domestic prices of potash began to stiffen, but that the domestic producers continued to yield more than half of the domestic market to the importers, notwithstanding the present capacity of domestic producers to supply the entire domestic demand for chlorides.

The proposed investigation of the American potash industry moved a step further on Apr. 16th when the Senate committee on Public Lands reported favorably on the Pittman Resolution and the matter is now before committee on Audit and Control as it calls for a $5,000 appropriation. It is thought unlikely that the matter will get very far at the present session.

Cost of Mixed Fertilizers

The fertilizer industry may also be made the object of an investigation by the Department of Justice. The anti-trust division is said to be studying statements of officials of Dept. of Agriculture before an appropriations committee of the House. Moving spirit is Rep. Malcom C. Tarver (Ga.) who claims that although the prices of raw fertilizer materials have declined in the past 15 years the cost of the finished product to the farmer has not.

N. F. A. Replies

The attack of Congressman Tarver did not go long unanswered by the National Fertilizer Association, spokesman for the fertilizer industry. Secretary Brand of the association on Apr. 25th sent a letter to the Georgia representative denying the existence of any such combination and supplying him with detailed statistics to refute the charges made.

Harmony Reigns

Allied Chemical's annual meeting a year ago was marked by critical comments from stockholders and threat of a proxy fight. This year, stockholders met without incident, with former dissenting groups apparently voting their proxies along with the management.

H. F. Atherton, president and chairman of the board, made a brief statement, saying that operations in the 1st quarter had benefited from the general business gains during the period, and were ahead of a year ago. He called attention to the fact that the management had voted 84½% of the capital shares outstanding, and that 86% were represented at the meeting in person or by proxy. This year 1,864,850 shares of capital stock were voted at the meeting, out of a total of 2,214,099 outstanding. This does not include 187,189 shares of common held in the treasury of the company.

Preponderance of proxies held by the management apparently indicates that the 500,000 shares held by Solvay American Investment, controlled by the Belgian Solvay Chemical interests, was voted with the management as well as the shares held by the Nichols family who founded General Chemical, now an Allied subsidiary. A year ago representatives of these interests announced that their stock was not being voted, and there was then some indication that a proxy fight for control of the company might be staged.

President Atherton announced at the annual meeting that the company's new plant for the manufacture of chlorine from salt without making caustic soda at the same time is nearing completion.

When Doctors Disagree

Highlight of the April meeting of the A. C. S. was the sharp disagreement among the technicians over the question of the superiority of alcohol-gasoline motor fuel blends. The Chemical Foundation and the Farm Chemurgic Council are giving active support to the construction of an alcohol plant at Atchison, Kans. (see C. I., April, p409), where blends will be produced. Plant is said to be the forerunner of several others scattered throughout the mid-west.

Said L. C. Lichty and E. J. Ziurys, experimenters at Yale University: "Only a slight increase in power is possible by substituting 190-proof alcohol for gasoline as a fuel in an internal combustion engine . . . approximately 60 to 65% more alcohol by weight is required to produce the same power in a given engine."

Analysis by Dr. Leo M. Christensen, associated with the Farm Chemurgic Council, resulted in the statement that anhydrous ethyl alcohol is not a substitute for gasoline but an ingredient of a superior fuel, resulting when so used in a greater power output unless a very lean mixture is used, in higher anti-knock properties, in a fuel with gum solvent attributes, and in comparable operating characteristics.

The flat statement that alcohol-gasoline is an inferior motor fuel in cost and operation, but admitting that higher anti-knock properties result from its use, was made by Dr. Gustav Egloff and Dr. J. C. Morrell of Universal Oil Products.

Fertilizer Self-Government

During the past month conferences have been held with Chairman March, Commissioner Davis, and the Director of Trade Practice Conferences of the Trade Commission by representatives of the N.F.A. with respect to the industry self-government plan. Work on the plan, which was delayed pending the Supreme Court decision as to the Sugar Institute case, is being expedited.

McGowan Reviews I. C. I. Prospects

Japan Cuts Into British Markets—Lever Bros. Obtains "Alternative to Soap" Rights—German Workers' Wages Analyzed—Japanese Chemical Industry in '35—Other Foreign Notes—

Sir Harry McGowan, British I. C. I. chairman, at the annual meeting, stated that he could only hope that '36 would yield results similar to '35. At home, the company's business so far this year has been better than last year.

Pamphlet report for year ended Dec. 31, '35, shows net profit of £6,706,539 after reserve for obsolescence and depreciation and provision for income taxes. After deducting £1,000,000 for general reserve, £217,366 contingent dividend reserve and £150,000 workers pension fund, there was a balance for the year of £5,339,173. This compares with net profit of £6,349,107 after reserve for obsolescence and depreciation and provision for income taxes and after appropriating £1,000,000 for general reserve there was a balance for '34 of £5,349,107.

Continuance of economic nationalism is forcing Imperial Chemical Industries to open plants abroad with a consequent reduction in manufacturing volume in Great Britain. In a number of export markets, Sir Harry declared, Great Britain is find-

ing it difficult to hold its own, owing to the conclusion by Germany of trading agreements on the barter-compensation basis. Continued expansion of Japanese influence in North China also has threatened British trade and in his opinion this calls for a firm stand by the British Government.

Rights on New Detergent

Important developments in the business of Lever Brothers were foreshadowed by Francis D'Arcy Cooper, chairman, at the annual meeting of the company in England.

Perhaps the most interesting development is conclusion of an agreement between the I. G. and Lever Brothers under which the English company has acquired, with certain exceptions, the world's marketing rights of a recent discovery, described as "an alternative to soap." According to the chairman, it is not possible at this stage to assess the importance of this discovery, but research is being carried on preliminary to marketing. Whether or not the "important discovery" is the use of the higher sulfonated alcohols is not definitely known here but it is strongly suspected. Also it is thought that one of the "certain exceptions" would be the U. S. and Canadian markets but nothing definite is yet known on the situation.

Below Our Standards

Average gross hourly wage paid by the German chemical industry amounted to 80.5 pfennigs, according to a survey made last August. On a weekly basis, the general average was 35.82 marks. Skilled male workers' average gross weekly earnings were 46.54 marks (between $18 and $19). Unskilled laborers and apprentices averaged 38.68 marks for a 45 hr. week. In addition, the German chemical worker is taxed for wage-taxes, poll taxes and contributions to social insurance, an average of 4.65 marks per week, equivalent to 13.0% of the average weekly wages. Consul Sydney B. Redecker, stationed at Frankfort-on-Main, I.G. headquarters, has forwarded to the Chemical Division of the Bureau of Foreign & Domestic Commerce a detailed report which is available to those interested.

Jap. Capacity Expands

While the Japanese chemical industry continued to expand very rapidly in '35, rate of growth was considerably below that of the 2 preceding years according to a report from Trade Commissioner Paul P. Steintorf, Tokyo.

Attention was centered upon the production of industrial chemicals to meet the needs of the nation's expanding industries, and to attain complete self-sufficiency in all essential products.

General conditions were very favorable to the growth of Japan's chemical industry; industrial production and foreign trade attained new highs, and agricultural conditions were relieved to some extent by the marked advance in prices of rice and silk cocoons. Japan's industry has now reached the stage where it is no longer dependent upon Western technique, but on the contrary is now developing processes. A number of products new to the Japanese industry were developed, including photographic chemicals, vanillin, blanc fixe, artificial butter and magnesium salts.

In the field of artificial fertilizers there was a marked gain in production but the accompanying increase in consumption prevented the industry from attaining complete self-sufficiency as had been anticipated. The dyestuffs industry also made rapid strides, attaining a large measure of self-sufficiency, and expanded into the export field to such an extent that the European Dye Cartel began negotiations with Japanese producers regarding the sale of dyes in China.

COMING EVENTS

American Petroleum Institute, Mid-Year Meeting, Mayo Hotel, Tulsa, Okla., May 13-15.
Natural Gasoline Association of America, Mayo Hotel, Tulsa, Okla., May 13-15.
Maryland-Delaware Water & Sewerage Association, Annual Meeting, Francis Scott Key Hotel, Frederick, Md., May 14-15.
Refrigerating Machinery Association, Spring Meeting, Hot Springs, Va., May 14-16.
Ceramic Association of N. Y., Annual Meeting, Alfred, N. Y., May 15.
Air Conditioning Manufacturers' Association, Annual Meeting, Hot Springs, Va., May 16.
International Petroleum Exposition and Congress, Tulsa, Okla., May 16-23.
New England Water Works Association, Concord, N. H., May 21.
American Gas Association, Production and Chemical Conference, N. Y. City, May 25-27.
National Association of Purchasing Agents, Inform-A-Show, New Orleans, La., May 25-28.
American Electro-Platers' Society, Annual Convention, Cleveland, Ohio, June 1-4.
American Association Cereal Chemists, Annual Meeting, Adolphus Hotel, Dallas, Tex., June 1-5.
National Sanitary Supply Association, Annual Meeting, Hotel New Yorker, N. Y. City, June 3-5.
American Petroleum Institute, Division of Production, Eastern District, Wm. Penn Hotel, Pittsburgh, June 4-5.
National Association of Insecticide and Disinfectant Manufacturers, Inc., Edgewater Beach Hotel, Chicago, June 8-9.
National Fertilizer Association, 12th Annual Convention, White Sulphur Springs, W. Va., June 8-9.
American Water Works Association, Annual Convention, Biltmore Hotel, Los Angeles, Cal., June 8-12.
American Society of Mechanical Engineers, Dallas, Tex., June 17-20.
Pennsylvania Water Works Operators Association, Annual Conference, State College, Pa., June 22-24.
Chemical Engineering Congress, Central Hall, Westminster, England, June 23-27.
Pennsylvania Sewage Works Association, Annual Conference, State College, Pa., June 24-26.
American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 29-July 3.
American Chemical Society, Semi-Annual Meeting, Pittsburgh, Sept. 7-12.
National Safety Council, 25th Annual Safety Congress, Atlantic City, N. J., Oct. 5-7.
Ohio Ceramic Industries Association, Annual Fall Meeting, Columbus, Ohio,, Oct. 9-10.
American Gas Association Convention, Atlantic City, N. J., week of Oct. 26.
American Association Textile Chemists and Colorists, Annual Meeting, Providence, R. I., Dec. 4, 5.
"Achema VIII," Plant exhibition, in connection with 50th General Meeting of Verein Deutscher Chemiker, Frankfurt, Germany, Sept., 1937.

LOCAL*

May 8. N. Y. Section, A.C.S., Joint meeting with N. Y. Section, Society of Chemical Industry; A.C.S. in charge.
May 21. N. Y. Paint, Varnish & Lacquer Association, Annual Meeting, Hotel Biltmore.
June 5. N. Y. Section, A.C.S., Regular meeting.

* Meetings held at Chemists Club unless otherwise noted.

Italian Chemical Activity

Statistics on Italian industrial employment, prepared by the Confederation of Industry, placed the average number of operatives employed in the chemical industry in August, '35, at 50,611 and total number of operating hours 8,740,000, as compared with 42,900 operatives and 8,160,000 operating hours in August, '34, an increase of 16% in workers and of 7% in total hours. These figures compare with 48,857 and 8,256,000, respectively, in December, '34. Although the figures are not strictly comparable, owing to the fact that the same number of factories are not reported every month, they present a reasonably complete picture of activity in the industry as a whole. Statistics indicate that the peak of activity occurred in March, with a daily average of 58,019 operatives and a monthly of 10,167,000 operating hours.

New Plant for Scholler Process

The Dessau Sugar and Chemical Industry Works is building a factory in Dessau, Germany, to turn out wood spirit (ethyl alcohol) by the Scholler process at the rate of 50,000 hectolitres per annum, the whole of which will be taken over by the Administrators of the State Alcohol Monopoly. Plans are also in hand for a 2nd factory at Holzminden with an annual capacity of 35,000 hectolitres. Finally, the plant of the Deutsche Bergin A.-G., at Mannheim-Rheinau, which is approaching the production stage, will be capable of a commencing annual output of 20,000 hectolitres of alcohol. Report on recent developments in wood saccharification, *Chemische Industrie*, Mar. 28th.

German Equipment

The "Achema VIII" exhibition of chemical plant, organized by the Dechema Deutsche Gesellschaft für chemisches Apparatewesen E. V. (German Chemical Plant Association), will be held in Frankfurt-am-Main early in September '37, together with the 50th General meeting of the Verein Deutscher Chemiker. Frankfurt-am-Main is not only suitable by reason of its geographical and economic position, but also because it was there that the Verein Deutscher Chemiker was founded in 1887.

Foreign Notes

Approximately 10,800,000 imperial gals. of gasoline were produced from 113,500

tons of coal by the British oil-from-coal plant, located at Billingham-on-tees, during the last 3 months of '35—an output representing almost the full capacity of the plant, a report from England states.

Quantity of alcohol denatured in Cuba last year for use as motor fuel declined considerably, due, it is said, to the high cost of molasses.

British import duties on soybean oil, cake and meal went higher in March, reaching 20% *ad valorem*. Safflower seed and sun-flower seed oils have also been subjected to import duty increases, owing to their similarity with soybean oil.

Moroccan phosphate rock deliveries during the 1st 9 months of '35 reached 938,429 metric tons, as compared with 909,351 metric tons during the 1st 9 months of '34.

Important deposits of salt and potash have recently been discovered in Austria.

Soviet chemists report successful operation of 1st experimental plant for production of alcohol from naphtha gas.

I.C.I. has acquired the du Pont interest in Nobel Chemical Finishes, Ltd., company's annual report shows.

Foreign Trade

Value of February chemical imports totaled $15,200,000 compared with $12,264,350 in January, and were 50% higher than in February a year ago, when the total was recorded at $9,995,700.

Paint Exports Gain 14%

U. S. exports of paints and paint materials, including naval stores, aggregated $2,577,300 in value during February, an increase of approximately 14% over February, '35. Gain was due largely to heavier shipments of ready mixed paints, varnishes and lacquers, carbon black and turpentine.

Exports of naval stores, gums and resins were valued at $1,180,800, an amount somewhat in excess of export sales in February last year, when the value amounted to $1,124,460. Turpentine exports advanced substantially to 629,170 gals., valued at $289,000, from 416,430 gals., valued at $207,700, in February, '35. Foreign demand for rosin, however, was weak, shipments amounting to 87,230 bbls., valued at $743,380, compared with 97,200, valued at $819,600, during February, last year.

A list of journals, proceedings, annuals, and other serials compiled from holdings of 49 chemical libraries may be obtained through Mrs. Hester A. Wetmore, 214 St. Paul st., Westfield, N. J. List is said to be more complete than either the H. W. Wilson union list or Chemical Abstracts, and was compiled by the Chemistry section, Special Libraries Association. Cost is $1.00.

Garvan Calls 2nd Dearborn Conference

Sixty Nationally Known Speakers will Address Over 1,000 Agriculturists, Industrialists and Scientists—Leather Chemists Again Pick Skytop—Other Association Happenings—

Second Dearborn Conference called by Francis P. Garvan, president of the Farm Chemurgic Council and of The Chemical Foundation, will be held at Dearborn, Mich., May 12th to 14th inclusive, with an estimated attendance of over 1000 agriculturists, industrialists and scientists. Stated purpose of the Council is to advance the industrial use of farm products through applied science, thus helping to relieve the surplus crop situation, creating new industries and aiding in the solution of the unemployment problem.

Approximately 60 nationally known speakers, will present formal papers and participate in the discussions. Reports of progress and new projects will be given concerning Chemurgic activities in agriculture, industry and science.

The Farm Chemurgic Council and the Chemical Foundation are now constructing the 1st power-alcohol plant in the U. S. at Atchison, Kan. (CHEMICAL INDUSTRIES, April, '36, p409). Plant will start operating within a month with a capacity of 10,000 gals. a day.

Orders in excess of capacity have been received at the plant. Alcohol will be used for blending with gasoline for motor fuel in middle western states. Corn will be used as the initial raw material. However, the plant is so constructed that other farm products such as sugar beets and artichokes may be used in alcohol distillation.

Interesting Leather Conference

Plans for the 33rd convention of the American Leather Chemists' Association, to be held again at Skytop, Pa., June 10-12th, are being formulated. Already listed are addresses by Dr. Fred O'Flaherty, Association's president, and Merrill A. Watson, executive vice-president of the Tanners' Council of America. Added to these will be a speech by Dr. A. O. Jaeger, of Cyanamid, on "Oxidation Catalysis, Its Influence and Effects on Leather Chemistry."

Also there will be presented by the University of Cincinnati Laboratory papers on "The Study of Goat Leather Spew"; "The Chemistry of Collagen"; "Vegetable Tan Liquor Fermentation"; "Animal Skin Lipids and Grain Wrinkles on Calf Skins." Papers from Lehigh will also be presented on "Studies in Chrome Liquors and on Formaldehyde Tannage."

Seek Decision on Loeb Fund

A. C. S. has applied to the Supreme Court of N. Y. for permission to turn over a $26,000 trust fund to the N. Y. Chemists Club. Fund, according to the will of the late Dr. Morris Loeb, once a Chemists Club president who died in '16, was for maintenance of "a chemical type museum" to contain all new products from industrial research. A. C. S. and Mrs. Edna Loeb, widow of the founder of the fund, believe that this purpose is now manifestly impossible, and hope to apply the fund to the Chemists Club library.

To Foster Soybean Uses

To foster development of more efficient low-cost textile dyes, the Dept. of Agriculture has joined with 12 Northern states in establishing in Urbana, Ill., a co-operative soy bean industrial research laboratory. Immediate objectives are: (1) improvement of present industrial uses and development of new industrial uses; (2) more facts on the effects of different processes on the quality of soy bean products, and (3) development of facilities for testing different varieties as to adaptability for industrial use. Laboratory is under the direction of Dr. O. E. May, of the Bureau of Chemistry and Soils.

Gas Technicians' Program

Annual joint conference of the Production and Chemical Committees of the American Gas Association will be held at the Hotel New Yorker, N. Y. City, May 25-27. Program Committee for the conference, of which E. J. Murphy of Brooklyn Union Gas, Brooklyn, and R. E. Kruger of the Rochester Gas and Electric, Rochester, N. Y., are co-chairmen, has developed a program which promises to be up to the high standards set by former conferences.

Association Notes

Arrangements have been made for a joint meeting of the Institution of Chemical Engineers with the A.I.Ch.E., to take place from June 28 to July 5, immediately following the Chemical Engineering Congress in England. Tour arranged is very attractive and reasonable in cost.

National Saftey Council welcomes new members, including Structural Gypsum Division of Cyanamid, Eastern Fertilizer, Norfolk, Va., Roxalin Flexible Lacquer, Elizabeth, N. J., and Synthane Corp., Oaks, Pa.

The newly formed Temperature Research Foundation of Kelvinator Corp., through its correspondence with group leaders all over the country, will function as a clearing house for authoritative

information on every phase of temperature research. Its editorial service will include brochures, news bulletins, lectures and radio talks.

Members of the Canadian Pulp & Paper Association Technical Section will join with TAPPI members this summer in business sessions at Montreal and on inspection tours of several Canadian paper mills.

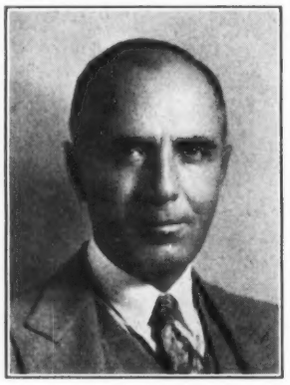
The 2nd International Congress on Glass is scheduled for London and Sheffield, Eng., July 2 to 11. American ceramists will attend under sponsorship of the Glass Division, American Ceramic Society.

The M. C. A. will hold its annual meeting at The Sea View Golf Club, Absecon, N. J., on June 4-5th. The S. O. C. M. A., as usual, will meet at the same time and place.

Derby Outlines Plans for Joliet Expansion

Speaks Before Enthusiastic Chamber of Commerce Meeting—Curme Honored by Franklin Institute—Personal Notes—

H. L. Derby, American Cyanamid & Chemical president, talked with over 200 members of the Joliet, Ill., Association of Commerce last month, outlining Cyanamid's plans for producing sulfuric acid in that city. New $500,000 plant now under construction should be ready for operation by early July. At present, Cyanamid officials are asking the I.C.C. for lower shipping rates on crude sulfur from East St. Louis to Joliet.



PRESIDENT H. L. DERBY

Discusses Cyanamid plant expansion in midwest.

Additional Honors

Dr. George O. Curme, Jr., Carbide & Carbon, will receive the Elliott Cresson Medal at the Franklin Institute on May 20th. "In consideration of his foundation of a new technology which has resulted in the development of a rapidly expanding industry, namely, that of synthetic aliphatic compounds based upon the olefines as starting material; and his development of profitable uses for these compounds in industry.

DR. GEORGE O. CURME, JR.

"For notable contributions to organic synthesis."

Heard Here and There

John J. Watson, president of the I.A.C., who makes his headquarters at Albany, Ga., each winter, has returned to N. Y. City.

George M. Weaver, vice-president and general manager, Smith Agricultural Chemical, is recovering from a severe case of the "flu."

Dr. Charles L. Mantell, professor of chemical engineering at Pratt in Brooklyn, spoke last month on "The Electrochemical Industries: Past, Present and Future," before the Western N. Y. Section of the A.C.S.

Wilmington chemists attended the recent Kansas City A.C.S. convention in large numbers. Those from du Pont were: Dr. E. B. Benger, Ira Williams, Roscoe H. Sawyer, Dr. J. F. T. Berlinger, Dr. P. L. Salzberg, Dr. Wallace Carothers, P. R. Austin, Dr. Herbert Lubs, Dr. C. Banta, F. B. Downing, E. F. Hitch, M. A. Bahen, Chaplin Tyler, and S. W. Long. Dr. Benger, Mr. Williams, and Mr. Sawyer presented papers. Chemists with Hercules Powder who attended were: W. E. Glore, J. N. Borglin, Emil Ott, and G. M. Norman. Those representing Atlas Powder were: J. T. Power and K. R. Brown.

Clinton H. Crane, president of the St. Joseph Lead, said Apr. 25th before sailing in the *Conte de Savoia* for a 2-weeks' vacation in Spain, that the company's quarter report will show considerable improvement over the same period a year ago.

President Lammot du Pont personally handed prize awards to the winners in the du Pont bowling league at a dinner held late last month at the Hotel du Pont. Speakers at the meeting, which was attended by 120 persons, included Walter S. Carpenter, Jr., and W. F. Harrington.

Opposition to government control of the transportation industry was voiced last month by Floyd T. Ridley of du Pont at the annual meeting of the Kanawha Valley Transportation Club.

Binney & Smith's Norman Lee Smith escaped without serious injury when last month an airliner in which he was journeying to South America overturned at Port of Spain, Trinidad.

Peter Dirr, vice-president of Charles L. Huisking & Co., and Mrs. Dirr returned last month from a Cuban trip.

The Charles Herty Medal of the Georgia Section, A.C.S., goes to Dr. Walter H. MacIntire, TVA consultant, for outstanding work in agricultural chemistry. Award is made yearly by faculty and students of Georgia State College for Women.

A. Anable, Dorr Co. advertising manager, will act as navigator in one of the boats entered in the famous Bermuda ocean race. He is well-known in yachting circles.

Recently elected N. Y. Chemists Club members include Fulton Brooks Flick, patent attorney, Blythe M. Reynolds, Heyden Chemical, and Leo Roon, Roxalin Flexible Lacquer.

"The Chemical Revolution" is the title of an article appearing in the May issue of *Nation's Business* by Williams Haynes, publisher of CHEMICAL INDUSTRIES. He describes the 5 important contributions to industrial economics being made by chemistry and how they are affecting everyday life and business.

Gustavus Ober, Jr., president of G. Ober & Sons, Baltimore fertilizer producer, is appointed assistant to the president of Fidelity & Deposit Co., Baltimore.

Oscar L. Biebinger, Mallinckrodt president, visited N. Y. City last month after 6 weeks' trip to Los Angeles, Panama and Havana.

Arthur P. Bopf, Bopf-Whittam president, with Mrs. Bopf, is on an extended West Indies cruise.

Rotary Club of N. Y.'s new president is Ernest V. Moncrieff, Swan Finch Oil president.

Charles L. Huisking, president of Conti Products and Huisking & Co., sailed in the *Washington* last month for his annual inspection tour of European connections. He expects to return in early June.

Percy C. Kingsbury, chief engineer, General Ceramics, sails May 30th in the *Britannic* for a short business trip to France and Germany. On June 22d he will go to London to join the American delegation to the Chemical Engineering Congress of the World Power Conference and will attend the joint meetings of the American Institute of Chemical Engineers and the British Institution of

Chemical Engineers, followed by the meeting of the Society of Chemical Industry in Liverpool. He will be accompanied by his wife and daughter.

A.C.S. Award in Pure Chemistry for '36 goes by unanimous vote to John Gamble Kirkwood, Cornell, for research on dielectric properties of matter under high pressures.

Robert T. Baldwin, Chlorine Institute secretary, discussed important legislation affecting the chemical industry before the Chemical Club of Philadelphia, last month.

N. Y. Paint, Varnish & Lacquer Association nominates Harry R. Hillman, Eagle Paint & Varnish president, to succeed E. S. Blackledge of Devoe & Raynolds as president for the coming year.

E. L. Luaces, well-known N. Y. City consultant on activated carbon, sailed in the *Hamburg* on May 6th for a 6-weeks business trip to Germany, France, Belgium and England. He will investigate latest developments in solvent recovery practices in Europe.

A son, to Mr. & Mrs. Carl A. Lechner, Wilmette, Ill. Mr. Lechner is Advance Solvents & Chemical mid-west representative.

Litigation

¶"Soapers" Lose $26,000,000 Coconut Oil Processing Levy Tax Suit—

Two hundred soap makers lost their collective $26,000,000 coconut oil processing levy tax case when on Apr. 27th Justice Jennings Bailey in District of Columbia Supreme Court sustained the constitutionality of the processing tax on Philippine coconut oil and refused to order a distribution of a fund which has accumulated from the levy collected from soap manufacturers.

Suit was filed several months ago by Haskins Brothers & Co. of Omaha, Neb., and was amended to represent nearly 200 other manufacturers. Fund has been impounded in the Treasury since Philippine sovereignty was established.

Plaintiffs, who started the action on the eve of the establishment of the new island government, contended that the fund should be returned to the taxpayers instead of held in trust for the Philippine Government.

Constitution prevents this government from levying a tax for the benefit of another government, plaintiffs said. Moreover, they argued that the tax was levied to reimburse the Philippines for a breach of an agreement to admit coconut oil duty free. Plaintiffs' counsel asserted that the tax is an attempt by Congress to regulate the prices and increase the demand for domestic fats and oils, a function that is delegated to the States under the 10th Amendment. Moreover, it was argued, the tax was not levied for the general welfare.

Justice Bailey held that the action was in reality a suit against the government, and the government had not consented to be sued.

"The debts of the U. S. for the payment of which Congress may levy and collect taxes under Article 1, Section 8, of the Constitution," he continued, "are not merely those which constitute legal obligations, but include obligations such as the one referred to, which are moral obligations upon the U. S.

"It would seem, therefore, that levying of the tax may be sustained both under this provision of the Constitution as well as under the power to regulate commerce."

Vegetable Oil Settlement

Chancellor Josiah O. Wolcott issues rule directing creditors of Vegetable Oil Corp., Wilmington, to appear and show cause why settlement of the estate, as proposed by George G. Stiegler, receiver, should not be approved by the court. Stiegler also asks leave to pay costs, totaling more than $2,000, and to distribute the remaining assets among the creditors, pro rata.

Foundation Enters Suit

Suit of the Chemical Foundation against General Aniline involves dyestuffs patents held by Dr. Richard Herz and assigned to the latter firm. Chemical Foundation holds that seizure of these patents by the alien property custodian during the war should make these patents property of the Foundation.

du Pont to Move Grasselli Headquarters

Nearly 300 Will Be Eventually Transferred to Wilmington—New Alcohol Producer Starts Production—Beacon Appoints New Representative—What the Companies Are Doing—

Cleveland, home of Grasselli Chemical since 1867, is losing over 300 citizens, through the decision of du Pont, now the parent company, to move the subsidiary's main offices to Wilmington, Del. Transfer will be gradual and should be completed by late summer. Changes in the federal taxation system is the compelling reason. New federal tax law no longer permits companies to consolidate for tax purposes the income of their subsidiaries. Other large chemical companies have been active in consolidating subsidiaries recently and more, it is thought, will follow.

First Cleveland executive to leave is Henry Gronemeyer, chief engineer, and T. J. Kearns, purchasing dept. head, is expected in Wilmington by May 1st. The trade has been anticipating such a consolidation move since T. S. Grasselli resigned the presidency to become a du Pont vice-president and was succeeded by E. W. Furst. Other executives of the company include Emmett C. Thompson, vice-president; Oscar M. Hook, secretary-treasurer; Howard P. Mansfield, director of sales; James H. Dunbar, director of operations; and M. Harry Miller, head of the legal department. Dates of their transfer, it was said, have not been set. Plant offices are not affected.

Hercules Moves Uptown

Hercules Powder officially opened its new N. Y. City offices at 22 E. 40th st., on Apr. 15th with a housewarming party attended by several hundred friends, customers and prominent executives in the chemical, naval stores, lacquer and allied fields. Walter M. Annette, local manager, Theodore Marvin, Hercules advertising manager, and a number of other officials from the Wilmington main offices were hosts.

New Producer in the Field

Allied Industrial Alcohol Corp., Brooklyn, N. Y., recently organized, has begun production of alcohol for industrial and beverage use, according to Walter J. Trautman, president and general manager. Production of pure alcohol is entirely mechanical, no chemicals being used in the process. Main offices are in the Chrysler Bldg., N. Y. City.

Appoints Chemical Sales

The Beacon Co., 89 Bickford st., Boston, manufacturer of special waxes, emulsifying agents, solvents, etc., has just appointed The Chemical Sales Corp., 1386 Niagara st., Buffalo, N. Y., a well known chemical distributer, as representative for N. Y. State and northern New Jersey. The Beacon products are widely used by metal polish, furniture polish manufacturers and other divisions of the chemical specialties field.

Company Notes

The Bin-Dicator Co., Detroit, is organized to manufacture and sell devices for automatic bin level indication and control. Bin-Dicator equipment previously has been handled by Ripley Mfg., Wayne, Mich.

Godfrey L. Cabot, Inc., Boston carbon black producer, leases coal, oil and gas rights in 25,000 acres on the northeast side of the Kanawha River, W. Va.

Bonewitz Chemical Co., with offices in Burlington, Council Bluffs and Des Moines, Iowa, has been organized to job and distribute industrial chemicals.

California Chemical, San Francisco, leases the Red Mountain magnesite mine at Patterson, Cal. Mine has estimated daily production capacity of 40 tons.

Potash Company of America opens branch office in Atlanta, Ga., at 716 Mortgage Guarantee Bldg. Stanley E. Ellis, formerly with Barrett and Hydro Carbon Products, is in charge.

Bradley & Baker, N. Y. City fertilizer material brokers, open a southern office at 505 Barnett Bank Bldg., Jacksonville, Fla. L. W. Putnam will have charge of sales.

Claude B. Schneible Co., Chicago manufacturer of dust suppression equipment, adds 5 new sales representatives, including Perry Engineering, N. Y. City, F. G. Schultz, Pittsburgh, Grant & Co., Los Angeles, Carl F. Miller & Co., Spokane, Wash., and Pacific Graphite, Oakland, Cal.

Link-Belt, conveyor chains and machinery, Chicago, appoints Industrial Supplies, Memphis, Tenn., as distributor for that territory.

P. & G. will grant a week's holiday with full pay to 7,000 workers this summer. Plants will be closed between July 1st and the 10th.

A. A. Holmes of U. S. Potash is again a proud grandfather. His son, J. B. S. Holmes of F. W. Berk & Co. is the father of a daughter, his 2nd child.

The All-du Pont Sports Tournament is booked for Sept. 25 and 26th, and, as in other years, will attract competitors from most of the plants and offices of the company throughout the country.

Robert J. Milano, formerly with R. & H. Division of du Pont, has organized the Millmaster Chemical Co., 55 W. 42nd st., N. Y. City, to handle heavy and fine chemicals, and laboratory reagents.

Copper sulfate for use in a flotation process has been undertaken by M. C. Bagby and J. H. English at Cardin, Okla.

Meh-Rit Tung Oil Industries, Tallahassee, Fla., is a new tung oil firm.

Gulf States Creosoting of Hattiesburg is establishing a plant at Wilmington, N. C.

The Brazil Wood Oil Corp. is a new oiticica oil importing house in N. Y. City.

Slash Pine Edition

Newsdom, the national newspaper of the newspaper world, was printed Mar. 28th on paper from Southern slash pine. Most of the issue was given over to acquainting American publishers with the possibilities of paper domestically produced from Southern slash pine.

Among the industrial exhibits at the Brooklyn Savings Bank, Brooklyn, is "New Chemicals of Commerce," CHEMICAL INDUSTRIES' exhibit at the last Chemical Exposition.

U. S. I. Advances Mason and Sloane

Jacobson, Former Calco Manager at Charleston, Named as Successor of Late C. O. North—Kentucky Color Announces Sales Personnel Changes—Others in New Positions—

At a meeting of the board of directors of U. S. I. on Apr. 23rd, J. Tenney Mason and Harry M. Sloane were elected vice presidents of the company. G. H. Walker, Jr., was elected a director to succeed his father, retired. Mason and Sloane were formerly assistants to the president and have been with U. S. I. for several years.

New Ohio-Apex Head

Bernard H. Jacobson, former Southern Calco general manager at South Charleston, is now Ohio-Apex general manager at Nitro, W. Va. He takes the place of the late C. O. North who was killed by an explosion in the plant laboratory a few months ago.

Katz Goes to N. Y.

Kentucky Color & Chemical transfers Richard Katz, Jr., from Cleveland, Detroit, Buffalo district to the N. Y. City sales office where he will assist Hugh Holton in covering N. Y. and New England sales. Ben V. Hendrickson, formerly with United Color & Pigment, will replace Mr. Katz in the mid-west.

Turbo Mixer Officers

At the annual meeting of the board of directors of Turbo Mixer, 247 Park ave., N. Y. City, the following officers were elected: James E. Moul, president and general manager; Calvin Truesdale, vice-president; Herman Armour Nichols, secretary and treasurer; Agnes H. Dunker, assistant secretary.

Personnel Changes Reported

The Dickerson Co., Philadelphia, appoints Charles A. Keough as manager.

W. E. Litkenhouse, formerly engaged in chemical engineering research for Goodyear, is now on the faculty of University of Louisville, Ky.

Douglass B. Bullard, formerly on Georgia Tech's chemistry faculty, is now with B. F. Goodrich's chemical department.

C. & O. Railroad Water Supply Department transfers H. B. Dale from Huntington, W. Va., to Peru, Ind., where he will take charge of the branch laboratory.

William L. Evers, formerly with Socony-Vacuum, is now a Resinous Products & Chemical research chemist, at Bridesburg, Pa.

George E. Rees is now in Sherwin-Williams' lacquer development laboratory, Chicago, after 6 years with Pittsburgh Plate Glass.

J. F. Maguire joins Beck, Koller's eastern division sales service staff. He will contact prospective synthetic resin users.

George Murnane, of Monnet & Murnane, is now an Allied Chemical & Dye director.

C. J. Hildebrand is now a U. S. Bronze Powder Works vice-president. He has been selling bronze powders on the Pacific coast for 50 years.

George M. Wambold succeeds Thomas E. Kearns as National Lead general superintendent, Atlantic branch. Mr. Wambold has been with National since '21.

American Catalin, N. Y. City, reappoints Bissell Brooke as Director of Publicity. Mr. Brooke will resume operation of The Catalin Fashion Bureau with a special campaign of feature articles in various trade publications.

Sherwin-Williams personnel changes last month included appointment of B. M. Van Cleve as general sales manager, pigment, chemical and color division, a new

ALBERT G. ZIMA

HAROLD L. GEIGER

International Nickel announces 2 important appointments. Albert G. Zima takes charge of the Development & Research Division at Los Angeles and Harold L. Geiger is the new Chicago field representative.

unit. F. P. Squibb has been transferred to Chicago as western manager of this division, and C. L. Stone, formerly in Cleveland, will take over Mr. Squibb's duties in N. Y. City.

Frank G. Moore, in addition to his duties as traffic manager of Southern Alkali, is now division traffic manager of the Columbia Chemical Division of Pittsburgh Plate Glass and Columbia Alkali, with headquarters at Barberton, Ohio.

Bristol Co., automatic control instruments, Waterbury, Conn., transfers their L. E. Mustard from Dallas, Tex., to Detroit where he will have charge of district sales and service.

William R. Schmitz, one of the few students to ever complete a 4-year chemical engineering course at Ohio State in 2 years, is now with the research laboratories of Du Pont Rayon at Buffalo, N. Y.

Carl Idding resumes his post as technical director for The Muralo Co., Staten Island, N. Y.

April Chemical Consumption Reaches Peak

Heavy Production Schedules in Principal Consuming Industries Cause Sudden Rise in Demand—Copper Sulfate Advanced 15c—Allen Issues Annual Mathieson Report—Dow Increases Stock—

April industrial chemical consumption reached a peak for the year with items consumed in the plating trades acting as the feature. Production in the Detroit area averaged better than 120,000 units a week during the month and May schedules call for approximately 100,000 a week. With the steel industry operating at better than 70% of capacity, movement of sulfuric is, at the moment, in heavy volume.

Consumption of rubber chemicals is highly satisfactory. Crude rubber consumption for April, about 48,000 tons, was of near record proportions. This figure has been exceeded only in 3 other months, even in the '29 period. Paper making chemicals are likely to enjoy a good year also, for world newsprint production is expected to reach a new high record during the current year, running about 4 to 5% over the 7,628,000 tons produced in '35.

Activity is somewhat mixed in the textile field. Rayon manufacturers are extremely busy and shipments of caustic and other vital chemicals into this field are close to record proportions. On the other hand, the trend in cotton cloth production is downward and the silk mills are none too busy. A pick-up in tanning operations was reported and shoe manufacturerers are busy despite the fact that stocks in dealers' hands are still large. The paint producers and lacquer manufacturers are seasonally enjoying the best year since '30.

Outstanding price change of the month was the 15c advance in copper sulfate. Such action was not unexpected with copper pointing higher over the past few months. Antimony metal declined during the month and caused a readjustment in certain of the salts. Tin derivatives closed out the month at lower levels when the metal went to 47c. World consumption of tin in the 12 months ended on Feb. 29th is estimated at 145,492 tons by the International Tin Research and Development Council, compared with 119,750 tons in the preceding year, a rise of 21.5%. Approximate world consumption in manufacture was 139,800 tons, against 129,000, an increase of 8.4%. Consumers' stocks rose 5,700 tons, compared with a decline of 9,250.

Important Price Changes

ADVANCED

	Apr. 30	Mar. 31
Cobalt oxide	$1.41	$1.29
Copper sulfate	4.00	3.85
Sodium silicofluoride	.06	.05¾

DECLINED

Antimony	$0.12⅝	.13⅛
Sodium antimoniate	.12¼	.12¾
Tin tetrachloride	.23¾	.24½

DEPT. OF LABOR STATISTICS

	Mar.'36	Feb.'36	Mar.'35
Employment *a*	108.0	107.1	103.4
Payrolls *a*	102.6	99.9	93.7

DATA FOR PROCESS INDUSTRIES

	Mar.'36	Feb.'36	Mar.'35
Explosives:			
Employment *a*	89.4	88.6	88.3
Payrolls *a*	86.0	80.8	73.0
Soap:			
Employment *a*	96.4	96.4	103.3
Payrolls *a*	95.0	94.5	95.9

	Mar. '36	Mar. '35
Exports	$1,897,000	$2,031,000
Imports	1,719,000	1,749,000
Crude sulfur, exports	557,000	579,000
Indus. Chemical Specialties, exports	1,605,000	1,525,000

a 1923-1925=100.0.

Apparent U. S. consumption was 66,439 tons, against 45,795, a gain of 45.1%, whereas the quantity used in manufacture rose to 60,770 tons from 54,550. Divergence was laid to an increase of about 4,000 tons in consumers' stocks in the recent year, against a depletion of about 1,000 tons in the previous year.

Seasonal activity in the agricultural insecticides, such as the arsenates, Bordeaux Mixture and Lime Sulfur Solution was reported to be quite satisfactory to the producers. The price structure is holding up well.

Earnings—Operations

Operating earnings of Mathieson Alkali for the March quarter showed a gain of over 10% above the corresponding '35 quarter but, due to an increase of over 30% in depreciation charges, net income was somewhat less. A report for the quarter ended Mar. 31, '36, shows net income of $289,692 after depreciation, depletion, federal income taxes, etc., equivalent after dividend requirements on 7% preferred stock to 30c a share on 830,513 shares of no-par common stock. This compares with $350,180 or 37c a share on 830,708 common shares in March quarter of previous year.

In his remarks to stockholders, President E. M. Allen states the increase in operating income was accomplished "in spite of difficult operations at our Saltville, Va., and Niagara Falls, N. Y., plants on account of weather conditions during January and February of this year. Results for the month of March showed marked improvement. The new Lake Charles, La., plant reached its highest production since operations started. The outlook for the 2nd quarter of this year is very promising."

Additions at Lake Charles

"Mathieson is completing installation of facilities for piping natural gas to the Lake Charles plant to be used initially as fuel. Use of the gas will begin on May 1st. The Lake Charles plant has been operating at a small profit but is only just beginning to get into its stride as a producer of earnings. It is expected to take another year to develop its full possibilities.

"The alkali business continues to be good with a firm price structure. Chlorine, of course, is in greatest demand and another price increase was made recently. Mathieson is working on plans in its research laboratories to produce chlorine independently of its affiliated product, caustic soda."

Dow's New Set-up

Dow stockholders, at a special meeting, have increased the authorized amount of non par value stock from one million to 2 million shares and the amount of preferred stock from 30,000 to 60,000 shares. Holders of the company's 7% cumulative preferred stock will have the privilege of exchanging it, share for share, for the new 5% cumulative preferred stock. Quarterly dividend at the 7% annual rate will be paid Aug. 15, '36, on all stock surrendered for exchange. Any of the 7% stock which shall not have been deposited for exchange prior to June 22nd will be called for redemption on Aug. 15, '36.

Board of Directors took action providing for exchange of the outstanding 7% cumulative preferred stock for the new 5% cumulative and called for redemption on Aug. 15, '36, all its 7% preferred stock, which shall not in the meantime have been so exchanged. No additional stock was offered for sale.

Paint Makers Cautious on Production Schedules

After 2 Busy Weeks Producers Reduce Operations—Lacquer Manufacturers Enjoy Good Business—Construction Figures Show Decided Gains—

Suppliers of raw paint materials report that the 1st 2 weeks of April were extremely busy ones, but, strangely enough, a definite slackening in demand was experienced in the final 2 weeks' period. Nevertheless, the total shipments for the

Paint sales dipped below '35 level in February, the result of severe weather.

month were the best for any month so far. What may have caused the slump is difficult to trace for the weather was ideal at least for part of the month for painting operations, and construction, particularly in the small homes field, is expanding at a rapid rate. In some quarters the decline in the stock market and the prominence given to the Administration's corporation tax plan are some of the reasons advanced. Others blame the prevalence of cool weather entirely.

Lacquer manufacturers are very busy supplying the demand from the automotive industry and the outlook at least through the middle of June is particularly bright. While the peak was expected around May 1st the production schedules are likely to stay at the 100,000 a week level through the middle of June.

Aside from the pronounced weakness in certain of the solvents, reported in detail in the Solvents Section, a period of pronounced price stability seems to have struck the raw paint materials markets. The only important price revisions were a reduction in casein and several adjustments in the varnish gums. Lowering of the casein prices was the result of larger quantities of domestic material becoming seasonally available. Shellac prices were somewhat firmer at the lower levels established in March. Despite a somewhat improved demand for naval stores last month, prices for turpentine went lower and the trend in rosin was downward, particularly in the higher priced grades. Little optimism prevailed in the Savannah and Jacksonville primary markets at the opening of the new naval stores year.

40 and 62% Gains Reported

March construction records, despite severe winter and harsh floods, showed a total value of 40% higher than was reported for February and about 62% ahead of the March, '35, volume. According to figures of F. W. Dodge Corp., covering 37 Eastern states, March construction contracts totaled $199,028,300 as compared with $142,050,200 for February and only $122,940,500 for March, '35. Increases were shown for residential and non-residential building as well as for heavy engineering types. For the 1st quarter, total contracts for all classes in the 37 states as a whole amounted to $545,871,300 as against only $297,761,500 for the corresponding quarter of '35.

Important Price Changes

DECLINED

	Apr. 30	Mar. 31
Casein, dom., 20-30	$0.14½	$0.15
80-100	.15	.15½

DEPT. OF LABOR STATISTICS

	Mar.'36	Feb.'36	Mar.'35
Employment *a*	108.2	107.2	104.2
Payrolls *a*	95.9	93.5	86.2

	Mar. '36	Mar. '35
Pigments, Paints and Varnish, exports	$1,543,000	$1,471,000

a 1923-1925=100.0.

N. P. V. & L. A. Picks Chicago

Annual meeting of the National Paint, Varnish & Lacquer Association will be held in the Drake Hotel, Chicago, sometime in early November, according to Ernest T. Trigg, president. Exact date has not yet been set.

Due to the intensive membership campaigns of the past 2 years membership of the Association now represents a large majority of the industry both in number of manufacturers involved and in total volume of production. Committee this year will direct its attention to the wide distribution of information regarding Association activities.

Carnauba Production

Statistics recently released by the Brazilian Department of Agriculture report the following production of carnauba wax in Brazil for the years '30-'34 as follows:

	Tons	*Contos*(1)
1930	7,835	27,266
1931	7,038	22,395
1932	9,557	29,789
1933	8,223	25,812
1934	9,412	41,338

(1) 1 conto equals approximately $56 at the present free rate of exchange and $80 at the official rate.

Substantial Iodine Reduction Announced

Several Iodides and Resublimed are Quoted Lower—Mercurials Stationary Despite Slight Reduction in the Metal—Glycerine Prices are Finally Raised—

Fine chemical manufacturers report that April shipments were in satisfactory volume. The loss in winter seasonal items was to a large extent offset by increased sales in such items as citric and tartaric acids, although sales of these acids have been retarded somewhat by cool weather. Chilean producers announced on May 1st a substantial reduction in crude prices. For a time it appeared that manufacturers of iodides would hold to the schedules in effect because prices were already at a very low point as a result of keen competitive conditions, but finally reductions were made in potassium iodide, sodium iodide, and resublimed.

Firm position of mercury changed slightly in the past month as domestic producers shipped larger quantities into the consuming areas and purchasing was in only very moderate volume. However, the decline of one dollar per flask caused no unsettlement in the prices for mercurials.

After months of scarcity of stocks of glycerine, producers finally placed in effect a general increase in prices for all grades. According to one theory advanced, the reluctance on the part of the producers to do this was said to be a fear that such action would increase the permanent use of substitutes. In contrast with the firm position in glycerine is the weak state of the alcohol market.

Silver nitrate was quoted at slightly lower levels after several months of stability. Menthol was reduced 15c in the 3rd week of the month, but in some quarters firmer and higher prices are anticipated in the early summer months.

Important Price Changes

ADVANCED

	Apr. 30	Mar. 31
Glycerine, C. P.	$0.14½	$0.14
Dynamite	.14½	.13¾
Soaplye	.10¼	.09½
Saponification	.11¼	.10¼
Yellow distilled	.14⅜	.13⅝
Naphthalene, refined	All pkgs. ½c. higher	
Silver nitrate	.32⅞	.32⅝

DECLINED

Acetophenone	$1.25	$1.40
Iodine, resublimed	1.50	1.65
Menthol, natural	3.30	3.35
Potassium iodide	1.10	1.25
Sodium iodide	1.90	2.00

DEPT. OF LABOR STATISTICS

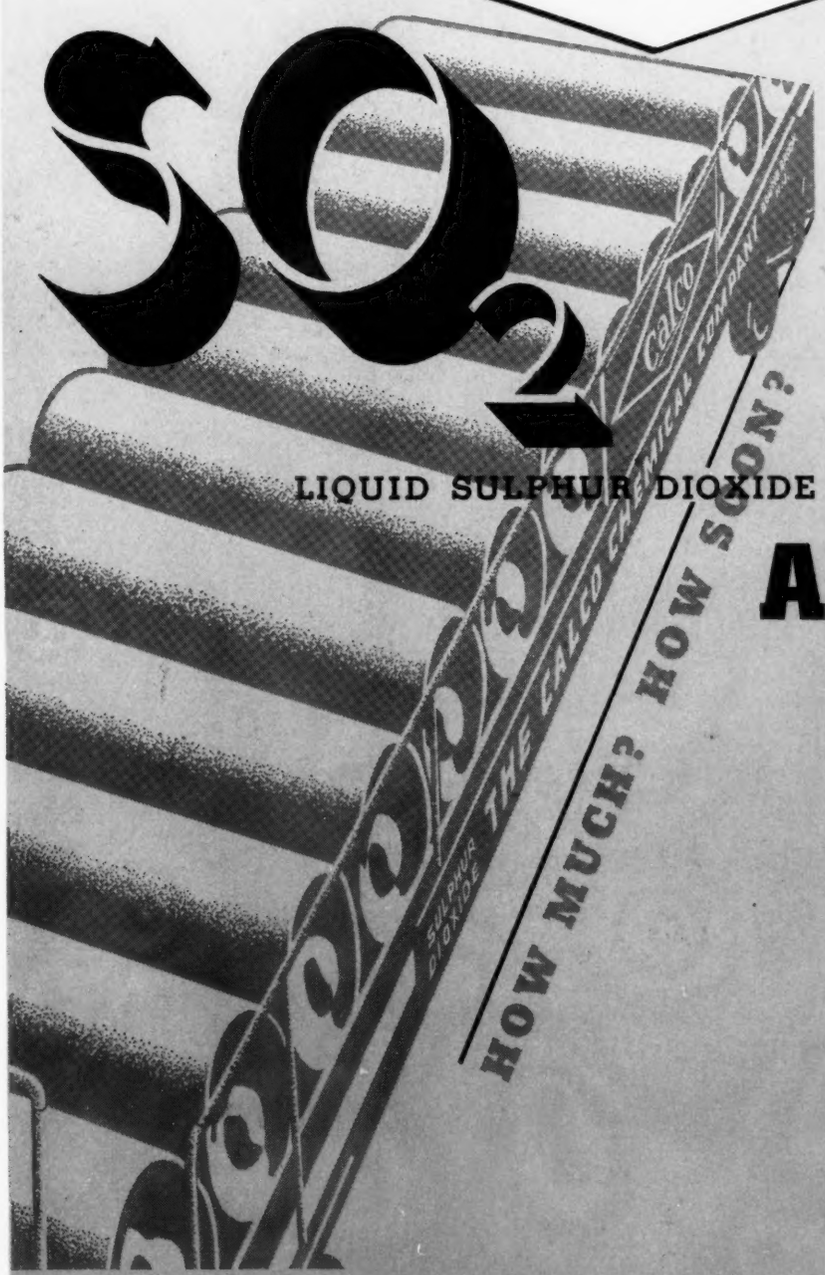
	Mar.'36	Feb.'36	Mar.'35
Employment, Druggist's preparations *a*	99.0	97.7	98.9
Payrolls, Druggist's preparations *a*	100.0	94.2	95.9

a 1923-1925 = 100.0.

Calco

SO_2

LIQUID SULPHUR DIOXIDE



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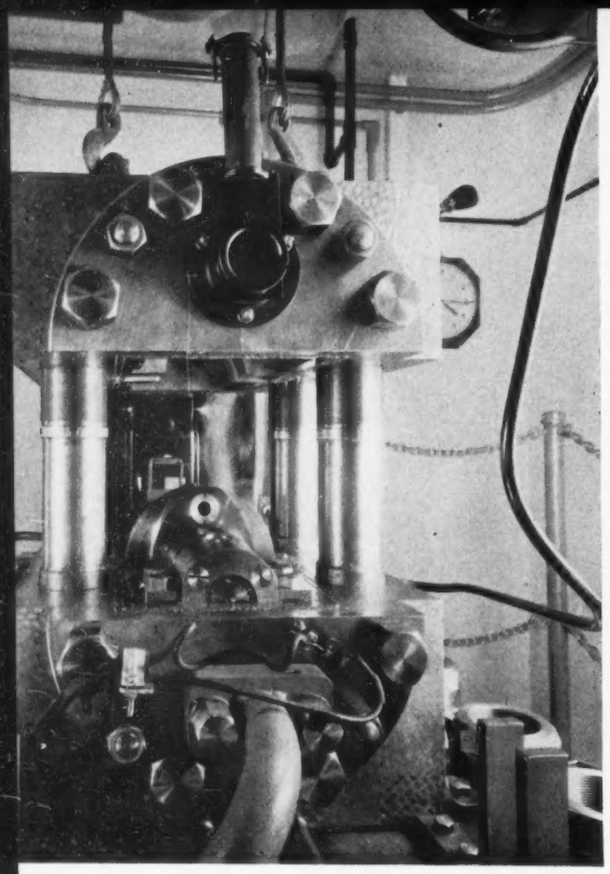


A close-up of the "business end" of the new du Pont centrifugal machine. For further details see page 502.

Miss Frances M. Suarez, Philadelphia Quartz Co.

Starting fifteen years ago from minus zero, chemical advertising has probably shown more improvement than in any other industrial field, and among those who have made notable contributions are the group on this page. As F. P. A. says—"No charge for the Advt."

Left, Logan Grupelli, National Oil Products Co.

Roland E. Sturhahn, Monsanto

Below, H. B. Hobbs, Victor Chemical Works. Lower left hand corner, M. S. Dennis, Grasselli Chemical Co.

Lower corner, Andrew Broggini and E. C. Friday, new products development manager, National Carbon Co., in conference.

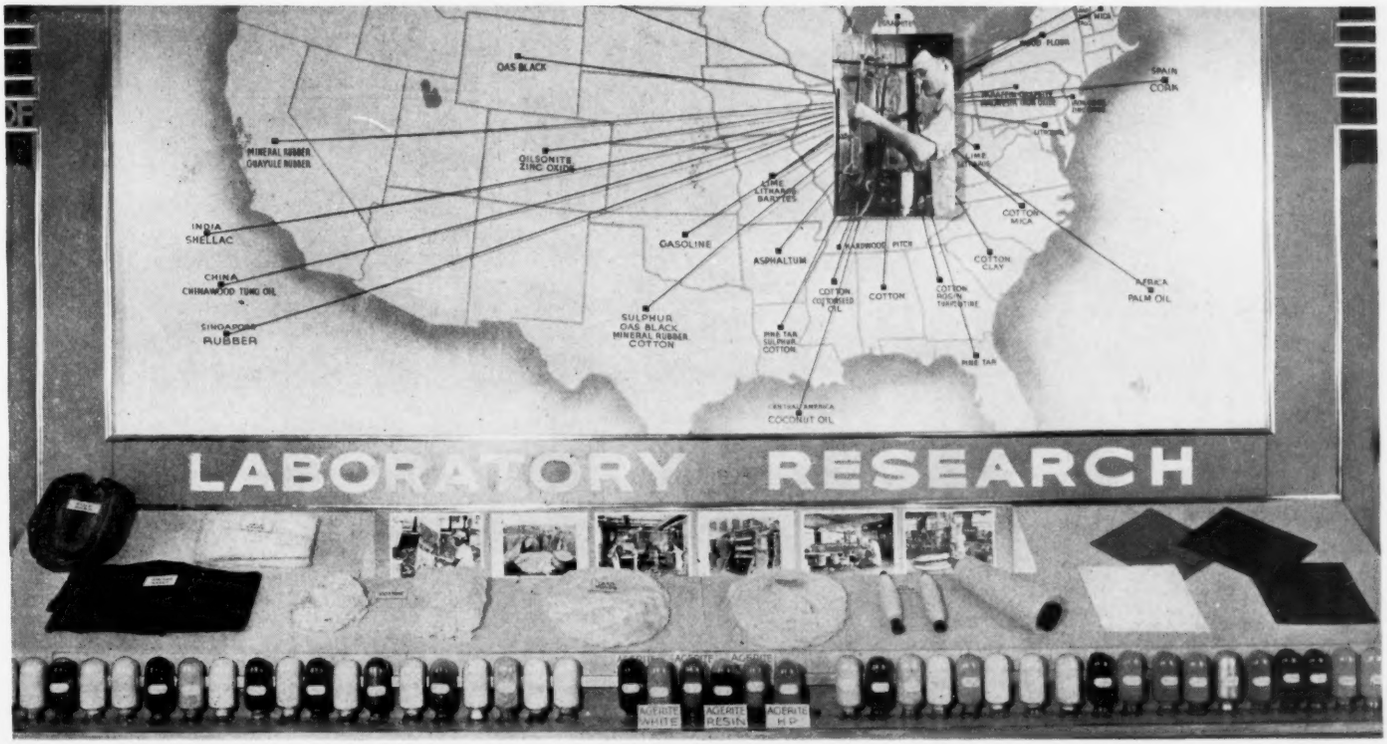
NEWS REEL

of Our Chemical Activities

The plant of Harrison & Company, makers of buffing and polishing compounds, at Haverhill, Mass., before and after the flood which recently descended upon their part of the country. Water at its peak was 14 ft. from the basement up to the street floor, and the factory has had to be thoroughly renovated.

Nearing completion in St. Louis are the new specially designed laboratories of Mallinckrodt where all research, control and analytical work will be centered.

At the recent exhibit of "Industrial Research" held at the New York Museum of Science and Industry, in Rockefeller Plaza, New York, one of the most "chemically-minded" of the displays was that of rubber and its fabrication and uses staged by The B. F. Goodrich Company.



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PRIOR CHEMICAL CORP.

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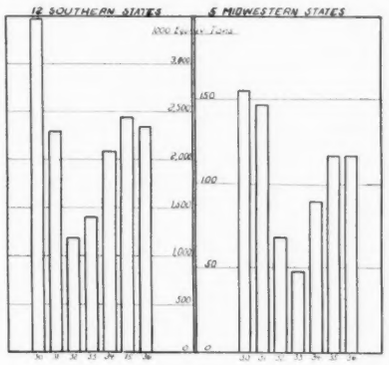
STANDARD CHROMATE CO., INC., PAINESVILLE, OHIO

Fertilizer Mixing Season Slightly Disappointing

Sulfate is Raised One Dollar a Ton, the Result of Recent Floods—No Change in Nitrate or Cyanamid—Potash Prices Renewed—N. F. A. Convention Dates Picked—

Sellers of raw fertilizer materials were just a little disappointed at the amount of business placed during April, but the volume, nevertheless, was quite large. Scarcity of sulfate stocks (caused by the floods in the previous month) forced a one dollar advance in quotations early in April, but in the latter part of the month



Fertilizer tag sales to date are slightly below '35 level.

some material was reported as sold by second hands at 50c under the established quotations. Organic ammoniates were in better demand, but with stocks in large volume, the price structure weakened and net losses were noted for the month. Opening of the Chesapeake menhaden futures trading saw prices at lower levels than prevailed at the same period a year ago. Potash prices were extended through May and June at unchanged levels.

Profit margins of fertilizer manufacturers during the current quarter promise to be moderately smaller than in the corresponding period of last year. There has been price cutting on mixed fertilizers. Prices of mixed fertilizers in the South are now said to be from $2 to $2.50 a ton lower than in '35. Shading of quotations has also occurred in the North, where the season is unusually late.

Peak Reached in '30

According to the records compiled by The N. F. A., the peak in fertilizer usage in the U. S. was reached in 1930, when total consumption amounted to 8,163,000 tons. Drastic reduction in farm purchasing power which began in 1930 resulted in the amount of fertilizer used falling off 46% between that year and '32, with the '32 tonnage 29% below the 1910-1914 average and the lowest for any year in the last quarter of a century. Reflecting the improvement in farm income which began in the Spring of '33, fertilizer consumption began to rise in the same year and the recovery continued through 1935.

Important Price Changes

ADVANCED

	Apr. 30	Mar. 31
Ammonium sulfate	$24.00	$23.00

DECLINED

Castor Pomace, Dom.	$15.00	$15.50
Tankage, N. Y., ungrd.	2.50	2.70
N. Y., grd.	2.85	3.00
Fert. grade, Chgo.	2.50	2.65
S. A., imp.	2.70	2.85

DEPT. OF LABOR STATISTICS

	Mar. '36	Mar. '35
Fertilizers & Materials:		
Exports	$2,047,000	$ 865,000
Imports	3,663,000	3,433,000

This three year rise, however, was only sufficient to raise '35 tonnage slightly above the pre-war average. There have been 14 years in the 1910-1935 period in which the consumption of fertilizer was larger than the 6,200,000 tons (approximate) reported for last year.

Superphosphate Production

March production of superphosphate declined seasonally from the preceding 3 months but was 8% larger than in March, '35. Increase over last year was due entirely to larger output in the Northern Area, as Southern producers reported a decline. For the 1st quarter production was 5.4% under the corresponding period of last year and 10.0% under the 1st quarter of '34.

Shipments of bulk superphosphate in March were the largest for any month since April, '31, but shipments in base and mixed goods failed to reach the Spring peaks of recent years. Shipments to consumers exceeded March of last year by 33% and were the largest for any month since April, '33, while shipments to mixers were the largest reported for any month since March, '31. Both areas have registered good increases in shipments of bulk superphosphate this year over last and have shown substantial declines in shipments in base and mixed goods. Total stocks at the close of March were 2.9% larger than a year earlier, with the rise due to larger stocks in base and mixed goods, stocks of bulk superphosphate having shown a decline.

March fertilizer tax tag sales in the 12 Southern states totaled 1,404,229 tons. Decline from March, '35, was 10,696 tons, or less than 1%. With the exception of last year, however, sales were the largest for any March since '30.

There has been a shifting tendency in the Spring distribution of tag sales in the South in recent years. Prior to the depression a very pronounced peak occurred in March, followed by a rather sharp drop in April. In the '26-'30 period March sales in the aggregate were 85% greater than April sales. More recently the difference between March and April has tended to diminish; in the '31-'35 period March sales averaged only 21% greater than April, while in 2 of the 5 years April exceeded March.

For the 1st quarter, sales in the South were 6% less than in January-March, '35, but with that exception were the largest for the initial quarter of any year since '30, exceeding the 1st quarter of '31 by a very slight margin. Seven of the 12 states reported sales below last year but in only one case was the reported tonnage below the '34 level.

March sales in the 5 reporting Midwestern states amounted to 71,694 tons, 19% larger than in March, '35, and the largest for any March in the 7 years for which the data are available.

Foreign trade in fertilizers and fertilizer materials was at an unusually high level in February, with the tonnage of both exports and imports the largest for any February since '30. Exports totalled 149,917 tons valued at $1,639,258, representing gains of 61% in tonnage and 101% in value over February, '35. Large increases in exports of materials with a relatively high value per ton, including ammonium sulfate, domestic synthetic sodium nitrate, and potash fertilizers, accounted for the greater increase in value than in volume. Imports amounted to 218,892 tons with a valuation of $4,622,262, the gain over February, '35, being 54% in both volume and value. Increase was due largely to a sharp rise in imports of sodium nitrate, which were the largest for any month since March, '31.

Convention, June 8-10th

The 12th annual NFA convention will be held at White Sulphur Springs, June 8-10th. It is expected that the program will be devoted very largely to a further discussion of industry planning and to the formulation of definite methods of procedure.

New Denaturing Rules

Bureau of Internal Revenue is sending several new completely denatured alcohol formulas to denaturers for testing and comment, according to Herbert J. Wollner, Treasury Dept. official. Bureau hopes that samples of the new formulas will be favorably received by the trade so that substitution for present C. D. formulas may result.

Specially denatured alcohol containing methanol is exempted from Regulations 92, according to recent Bureau of Internal Revenue ruling. Regulation provides that firms selling products of more than 25% alcohol content must make detailed reports of daily sales to industrial alcohol supervisors.

Bullish Outlook for Tung Oil Prices

Domestic Situation and Supplies at Primary Market Analyzed—Cottonseed Prices Break Further—California Fish Oil Industry Fears "Floating Factories"—

Trading in most of the fats and oils was of a routine nature in the past 30 days. In the 1st half of the month chinawood and oiticica turned bullish but most of the increases were lost in the latter half. Several of the more important vegetable oils, including corn, soybean, coconut and linseed closed out the month at lower price levels. Several of the fish oils, too, were weak. Trading in animal fats was slow and the price structure declined in the Chicago market. Cottonseed continued to decline.

Domestic Increase 70%

U. S. industrial consumption of tung oil has increased approximately 70% during the past 4 years bringing the total for '35 to about 127,600,000 lbs. This compares with an estimated consumption of 121,500,000 lbs. in '34, 105,000,000 in '33, and 75,000,000 during '32. Based on the average domestic price of 18c per lb. during the year, American manufacturers paid out in the neighborhood of $23,000,000 for tung oil in '35. With the exception of relatively small quantities from Gulf Coast plantations, where an American tung industry is now being developed, all of our '35 supply of tung oil came from China.

High prices for China wood oil over the rest of the year are now anticipated. New high quotations for the year were reached last month. It is felt by some observers that quotations may again touch the extremely high level of last fall.

Stocks of new crop oil in China have recently been almost negligible, as heavy American demand has absorbed offerings. New crop is expected to be moderately larger than last year's, but exhaustion of stocks here last fall and expanding American paint consumption promise a demand well above that of the past few years. Exports from Hangkow from December to February were more than 50% larger than in the corresponding period a year ago. If the final harvest does not exceed estimates and American paint consumption continues to rise, a "squeeze" might again occur. In sympathy with the rise in China wood the market for oiticia was considerably higher.

Quotations at Hankow continued to increase in March reaching a figure at the close of the month which was approximately 12% higher than on February 29th and 41% above the price quoted on Jan. 2nd. Stocks at Hankow continued low amounting to 510 short tons on Mar. 31st, but were higher than the amount available at the end of February when stocks of 310 tons were reported. Current crop which is now about half in is estimated to be about 10 to 15% better than that of the '34-'35 season.

The Lowly Sardine

California is developing a new type of fisherman. He is the operator of the "floating fish factory" which has invaded the sardine industry and which, according to officials of the California State Fish and Game Commission, threatens to sweep the West Coast clear of this tiny fish. The sardine ranks 2nd only to salmon in the Pacific Coast seafood canning industry.

The floating fish factory combines fishing, refrigeration and reduction plants, all operating on the high seas. Its products are sardine oil and meal, on the output of which the Fish and Game Commission is seeking to place rigid restrictions in an effort to save the sardine from extinction.

Floating fish reduction plants were 1st tried unsuccessfully in Alaska in the early Nineteen Twenties. Idea was abandoned until recently, when the California sardine fishermen hit upon it as a means of outwitting the State. Now, it is said, their operations threaten the $15,000,000-a-year industry and signal the downfall of the little fishermen.

For many years the Fish and Game Commission has taken the stand that sardines are essentially a food, and must be canned, and that only a small percentage of the catch may be used for the development of oil and meal, the lucrative by-products. Though it relented somewhat during the depression in order to give employment to more fishermen, its ruling, that only 4,000 of 12,000 tons taken may be converted into oil and meal, is still irksome to the industry. This year, fearful that wanton exploitation was exterminating the fish, the commission tightened up again.

But outside the 3-mile limit and State jurisdiction owners of the elaborate floating factories can flout the commission, reduce an unlimited amount of sardines and, in addition, escape the 50c tonnage tax which their rivals on land must pay.

Palmkernel Exemption?

Rep. Glenn Griswold (Ind.) has introduced a bill into the House (H. R. 12055) which would exempt palmkernel oil, crushed and denatured in the U. S., from processing and import taxes.

Naphthalene Shortage is Serious

Active Season for Refined Material Brings Crisis in Stocks—Imported Cresylic Again Higher—Coal Tar Solvents in Good Demand—Coke Operations Declined in March—

With the active refined naphthalene season now at hand, the problem of obtaining sufficient supplies has become a very acute situation for many repackers, and prices were advanced ½c in April. Crude material quotations are purely nominal, and even the increases in coking operations in the past several months have not served to create sufficient domestic supplies to offset the losses in normal imports.

Practically all divisions of the coal tar industry enjoyed increases in shipments. With activity in both the automotive and rubber centers at record proportions, the call for benzol, toluol, xylol and solvent naphtha was heavier than at any other time in several years and spot stocks were difficult to obtain. Stocks of cresylic are said to be close to the vanishing point. Resin manufacturers and disinfectant makers are genuinely worried over supplies. Importers of the item raised quotations 3c about the middle of the month, but the volume of imports is limited. Phenol stocks, too, are rather scarce at the moment, but no change has been made in current quotations.

Intermediates were in fair demand during the past 30-day period, but dye manufacturers are apparently taking supplies on a conservative basis until indications of further improvement in certain branches of the textile field are of a more definite nature.

Important Price Changes

ADVANCED

	Apr. 30	Mar. 31
Acid Cresylic, Imp.	$0.66	$0.63

DECLINED

None.

Coke Production Off 4.5%

March production of coke from by-product and beehive ovens amounted to 3,366,665 tons. This represented a daily average output of 109,280 tons, which was 4.5% below that of February but 11.7% above the rate prevailing in March a year ago. Total tonnage for the 1st quarter increased 15.2% over the corresponding period of '35, while production of pig iron in the same period increased 21.3%. Output of byproduct coke for the 31 days in March was 3,257,365 tons, or

105,076 tons per day. In comparison with February, average daily production decreased 3.0%, a decline shared almost equally by merchant and furnace plants. Output of beehive coke dropped sharply, from 152,500 tons in February to 109,300 tons in March. On a daily basis the decrease amounted to 31.1%. Stocks of by-product coke were 13.3% higher at the end of March than at the beginning of the month. Merchant plants increased their stock piles by 23.0%, while at furnace plants reserves exceeded those of February by only 2.9%.

Construction

¶Carbide's President Announces $20,000,000 Construction Budget in Annual Message to Stockholders — Other Construction Plans—

Carbide plans a construction budget for '36 of approximately $20,000,000, Jesse Ricks, president of the company, stated at the annual meeting on Apr. 21st. Of this amount, $6,000,000 will be expended for a new chemical plant in the Southwest, $4,700,000 for the completion of projects now under way and the remainder for various other new construction.

Mr. Ricks announced that earnings for the first quarter were at a new high for that period in the company's history. He also stated that the company has developed a new product to be used in the manufacture of shatter-proof glass and that the new plant to make this product, with annual capacity of 4,000,000 lbs., is being built.

Directors were re-elected, with the exception of Charles W. Mead, who resigned.

New Construction Planned

Plans and specifications for a $10,000 addition to one of its Niagara Falls plant buildings have been filed by Niacet Chemical. Plans for installation of a raw water supply system at Niagara Alkali's plant have also been filed.

Westvaco Chlorine's expansion program at South Charleston, W. Va., includes a new 2-story brick office building, estimated to cost $30,000, and the drilling of 5 new salt wells in the hills near the plant.

National Carbon will spend $200,000 at its Fostoria, Ohio, plant.

University of Delaware will erect a $230,000 chemistry building.

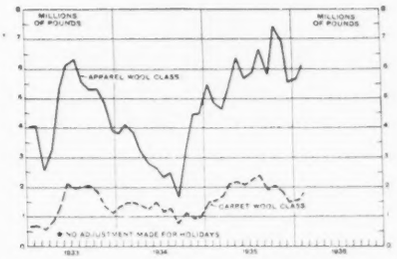
Course for Paint Technicians

Pratt Institute, Brooklyn, N. Y., has completed a course in paint and varnish technology in which specialists of various paint, lacquer and plastics companies gave one-hour lectures. Dr. C. L. Mantell, well-known consultant, was in charge of the course.

Trend in Textiles Mixed; Tanners More Active

Rayon Producers Are Operating Near Capacity, But Other Divisions Fail to Make Progress—Shoe Production Figures Are Encouraging—Sumac Is Weak—

Buyers of dyes, chemicals and specialties in the textile industry continued to adhere in most cases to a policy of conservative purchasing during the past month. Certain divisions of the industry, notably cotton cloth, wool and silk, are not as active at this period of the year as the manufacturers had earlier hoped for. Further, the immediate outlook is for some additional slackening in the production schedules. On the other hand, rayon producers are not complaining at present consumption figures.



After the sensational consumption of wool in '35 the trend is definitely down.

Show Spurs Sales

An improvement was reported last month in the volume of tanstuffs, oils and chemicals taken by the tanners. The recent Tanners' Council Show at the Waldorf in N. Y. City has served as an impetus to the shoe manufacturers. Production of boots and shoes is expected to run ahead of the high level of last year throughout most of the spring, although stocks of finished shoes are relatively large. Production for the 1st quarter was reported as being 3.7% ahead of the same period last year while retail sales were up 11%. A fairly sharp curtailment may be necessary, however, during the summer months.

Few Chemical Price Changes

Price changes in textile and tanning chemicals were few in number during the past 30 days. Sumac was offered late in the month at $52, a net decline of $3 a ton. The explanation offered by importers for the weakness is unsettled conditions in the primary markets. Stronger markets for corn caused a 10c advance in starch and dextrin. No published price changes were reported for tanning and textile oils but the competitive position of these items remains unchanged.

In the Field of Colors

The demand for bright colors for use in the textile, shoe and glove fields is a feature of spring purchasing, according to a consensus of opinions expressed by N. Y. City merchandisers.

Textile Color Card Association announces "Preakness Oriole," a light orange tone, created by invitation in honor of Baltimore's famous "Preakness" week.

Important Price Changes

	Apr. 30	Mar. 31
ADVANCED		
Corn sugar, 42°	$3.25	$3.15
43°	3.30	3.20
Corn, sugar, tanners	3.28	3.18
Dextrin, corn	3.65	3.55
British gum	3.90	3.80
White	3.60	3.50
Mangrove bark	27.00	26.50
Starch, Pearl	3.19	3.09
Powd.	3.29	3.19
DECLINED		
Egg yolk	$0.49	$0.51
Sumac, Italian	52.00	53.00
Valonia beards	60.00	64.50
Wattle bark	27.00	29.25

Plants

Franco-American Chemical Works, Carlstadt, N. J., has been awarded the certificate of merit in the '35 N. J. State-Wide Interplant Safety Contest, conducted by the Dept. of Labor. This is the 3rd consecutive year the plant has won the perfect record award, having experienced no loss-time accident.

Carbide and du Pont plants in the Charleston area will be represented on the diamond in a new industrial league. At the organization meeting Major A. E. Haan represented du Pont and G. H. Sears and George Ratcliffe, Carbide. Electro Metallurgical may also have a team in the organization.

Carbide's plant at Charleston is represented in a chess league.

Carbide and du Pont were among the companies donating trophies for the *Charleston Gazette's* relays.

Viscose is reported planning broad expansion at the Nitro plant.

New Trade Treaties

The U. S.-Colombia "reciprocal trade agreement" becomes effective May 20. Colombia will reduce duties on American exports of lard, cosmetics, pharmaceuticals, paints, and some chemicals in return for U. S. reductions on certain oil bearing raw materials and balsam. According to Washington reports, new trade agreements with France and her colonies are also completed, but details are lacking.

Many of the processes employed in the refining of coal tar products have been developed by the Koppers companies. A competent technical staff is constantly at work to introduce further process refinements and to insure the high quality of all Koppers products. The Koppers laboratories are abreast of all new developments in the field of coal tar products. Their services are at your command.

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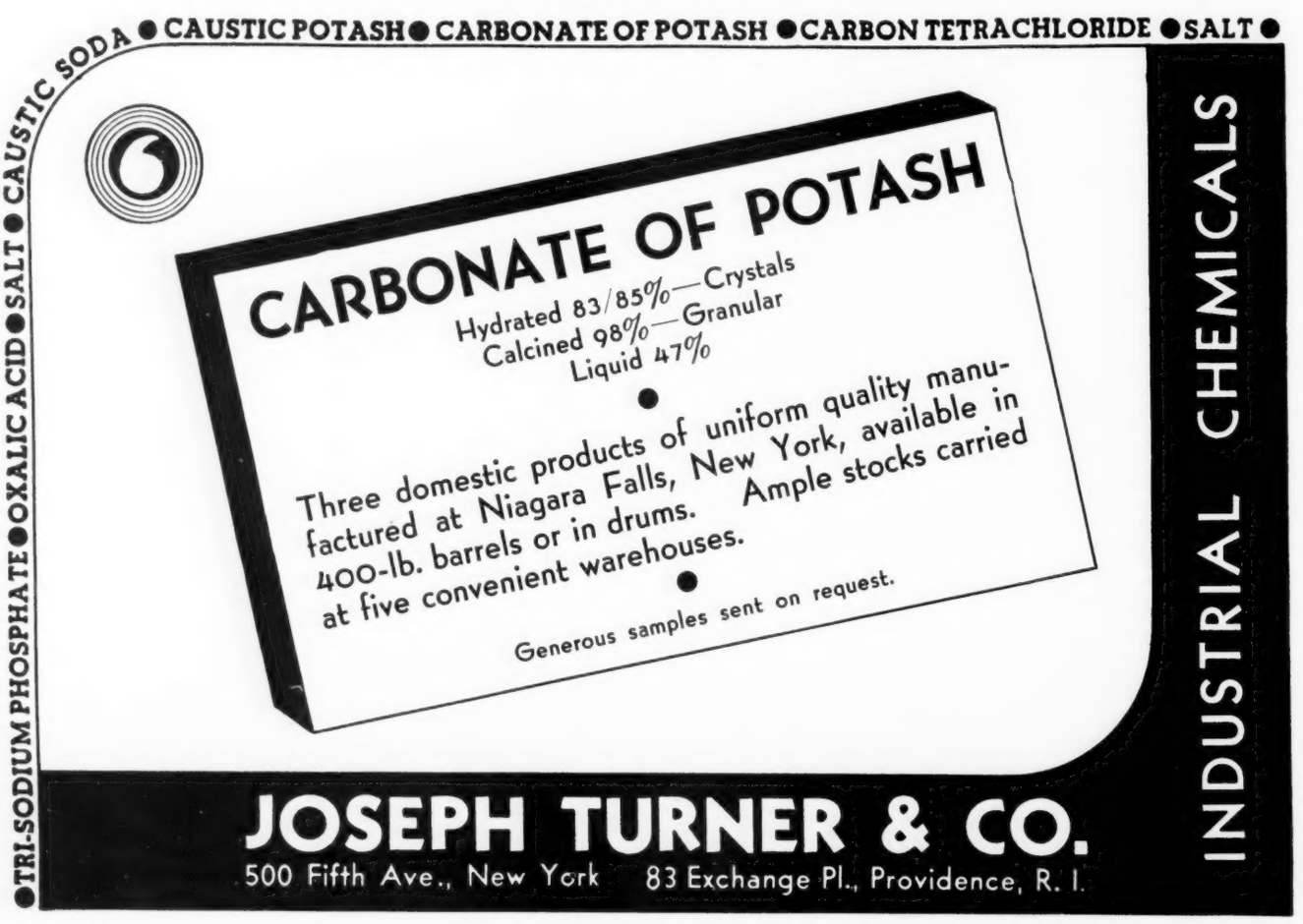
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Solvents

¶Weakness in Butyl Alcohol Again Features Market — Consumption of Solvents at Year's Peak—

Even the rapid pace in the automotive industry last month failed to stop the competitive situation in certain of the so-called lacquer solvents from becoming more acute. Price reductions were reported for butyl acetate, butyl alcohol, ethyl acetate and isopropyl acetate.

Important Price Changes

ADVANCED

	Apr. 30	Mar. 31
Naphtha, high Solvency, East	$0.17	$0.16½

DECLINED

Alcohol, butyl, drs.	.09½	.08½
Tks.	.08½	.09½
Alcohol, special solvent, tks.	.27	.29
Butyl Acetate, drs.	.09½	.10½
Tks.	.08½	.09½
Ethyl acetate, all containers	½c.	
Petroleum Thinner, East	.09	.09½

DEPT. OF LABOR STATISTICS

	Mar.'36	Feb.'36	Mar.'35
Petroleum Refining:			
Employment *a*	107.6	z108.0	107.9
Payrolls *a*	104.0	98.5	96.4

	Mar. '36	Mar. '35
Petroleum & Products:		
Exports	$19,452,000	$20,250,000
Imports	2,751,000	4,397,000

a 1923-25 = 100.0; *z* Revised.

In the petroleum solvents field a ½c decline was noted in the East on tankcar quotations for petroleum thinners and reductions were reported in tankwagon deliveries of petroleum thinners, Stoddard solvent and v. m. & p. naphthas in N. Y. and Northern New Jersey points. Earlier in the month Stoddard solvent in tankwagons, Chicago, was reduced to 14c. Producers of aromatic high-solvency naphthas revised quotations and are now offering tankcars at 17c delivered within 100 miles of the producing point and 16¼c for delivery 100 miles beyond, with freight equalized with the nearest producing point.

Severe competition is blamed for a reduction of 2c per gallon in special solvent alcohol, effective East of the Rockies. The new level is 27c in tanks and 32c for drums in carlots.

Obituaries

Professor S. D. Conner, 64, of Purdue University, following an emergency operation, Apr. 19th. Professor Conner had been with the University since 1899, and was famous for his work on soil fertility problems. He had trained many young men for research in soil chemistry.

Dr. Theodore Clinton Taylor, 45, consultant, and organic chemistry professor at Columbia, following long illness, Apr. 20th. He was the author of an organic chemistry text and a frequent contributor to scientific literature.

Albert Farwell Bemis, 65, chairman of Bemis Bag and Atlantic Gypsum Products, and Bemis Industries president, in Phoenix, Ariz., Apr. 4th. Mr. Bemis was injured in a fall while vacationing in the Southwest. Besides his leadership in packing and chemical fields, he was a nationally known housing expert and author of a text on that subject.

John Tittel, 80, retired chemical engineer, in Irvington, N. J., Apr. 13th.

William Charles Peyton, 67, founder of Peyton Chemical (now part of General Chemical), and head of several other prominent concerns, in N. Y. City, Apr. 4th. Mr. Peyton was the inventor of "Peyton powder," an early smokeless form of powder.

Lewis C. Chamberlin, 42, manager of the Carbon Dioxide Division of Michigan Alkali, died in Lawrence Hospital, Bronxville, N. Y., May 2nd, after a brief illness. Mr. Chamberlin, a native of Chicago, had been a resident of Tuckahoe, N. Y., for a little more than 3 years. He had lived the greater part of his life in Chicago. He was connected with the Nizer Corp., Detroit, from '24 to '28; with Dry Ice from '28 to '30; and with Michigan Alkali from Dec. 1st, '30, where he was in charge of the sale of solid carbon dioxide.

Sir Frederick Charles Bowring, 79, chairman of the board of C. T. Bowring & Co., London, at his home in Liverpool, Eng., Mar. 24. Besides having been prominent in fish oil, shellac and naval stores circles abroad, Sir Frederick was Lord Mayor of Liverpool for 2 years.

Albert H. Seep, 64, president of Mine & Supply, Denver, on Mar. 28th.

W. F. Farmer, vice-president and manager, Anderson Fertilizer, on Apr. 9th, following an illness of several months. He was a member of the NFA board of directors.

Samuel Woolfenden, 76, sole owner of Empire Chemical, Utica, chemical jobber, on Apr. 15th.

Dr. Albert H. Low, 81, formerly head of the Colorado School of Mines chemical department, in Denver, Apr. 9th. Dr. Low had written several texts on ores.

Dr. E. O. Dieterich, 46, physical research manager for B. F. Goodrich, at his home in Akron, Apr. 25th.

With New Addresses

U. S. I. Sales moves Philadelphia office to the Terminal Commerce Bldg., 401 N. Broad st.

Verde Quicksilver Sales, N. Y. City, moves to larger quarters at 111 Broadway.

U. S. Potash moves its N. Y. City executive offices to 30 Rockefeller Plaza, Rm. 3517. Former address was 342 Madison ave.

Hosken & Co., chemical importer, and Hosken Trading Co. move to 112 Park ave., N. Y. City, where they will make temporary quarters until establishing permanent offices on Madison ave.

Paul O. Abbe, Inc., Little Falls, N. J., manufacturers of ball and pebble mills and mixers, opens a Chicago office at 407 S. Dearborn st. C. H. Goggin has charge.

Pfaltz & Bauer, long established supplier of raw materials and scientific apparatus, and a fixture in Pearl st., N. Y. City, for 36 years, is now in the Empire State Bldg.

Fred L. Lavanburg Co., color manufacturer, is consolidating N. Y. City offices and factory at 105 Bedford ave., Brooklyn.

Glyco Products has incorporated offices, warehouse and laboratories at 148 Lafayette st., N. Y. City, Telephone Canal 6-6510.

J. S. Young & Co. and Young Aniline Works have relocated their N. Y. City offices at 11 Park Pl.

Korite, Inc., producer of insecticides, disinfectants, metal polish, liquid soaps and specialty oils, moves to larger quarters at 80 Fountain st., Pawtucket, R. I.

Fires

Toomer Fertilizer, Orlando, Fla., $40,000, on Apr. 19th.

National Sulphur, Bayonne, N. J., destroying warehouse and several tons of sulfur, Apr. 26th.

Naval Stores

¶Price Weakness Again Occurs as New Season Opens—

The new naval stores year opened Apr. 1st with little enthusiasm being displayed in the primary centers. The heavy Government-owned stocks are still a serious threat to the price situation and this condition was reflected in further declines in both turpentine and rosin. In the latter the better grades were the most affected. Shipments, particularly exports, however, were seasonally better. Leading factors are hoping that the improvement in construction will "boost" domestic business substantially over the next few months.

Turpentine producers in the Southeast have formed a new organization, the American Turpentine Farmers' Association. Federal consent will be sought to withhold indefinitely from the markets some 140,000 bbls. of turpentine.

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Extensive experience in the use of benzol has given Jones & Laughlin a broad understanding of the varying needs which the manufacture of widely differing products imposes. This experience, together with an expert technical staff and proper production facilities, has equipped J & L to supply benzol to satisfy individual requirements. We will welcome the opportunity of furnishing a sample made to your specifications. Look to Jones & Laughlin, also, for structural steel, pipe, boiler tubes, and all of the other steel products that you use.

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French Naval Stores

The French turpentine and rosin industry is unique in that its development has been due very largely to a reclamation project begun during the closing years of the 18th century. Area was at one time a deserted marsh and sandy region almost without inhabitants. Efforts to control the shifting sand dunes in this region, which borders on the Bay of Biscay, began about 1800 when a large number of maritime pine trees were planted, but it was not until 1857 when the area was drained that real progress was made. The French industry is therefore of considerable interest and importance, not only from the standpoint of production and distribution of naval stores but also from the standpoint of conservation and utilization of natural resources. France is 2nd only to the U. S. as a producer of naval stores, accounting for one-fifth of the world output against two-thirds supplied by the U. S. Producing area of France, however, is only one-thirtieth that of the U. S., and the relatively large output is due only to careful planning and intensive exploitation.

U. S. Tariff Commission Issues Nitrogen Statistics

Valuable Survey of World Capacities, Present Operating Schedules Released—Price Discrimination Bill Passes Senate

The U. S. Tariff Commission, in the course of its regular work, has gathered certain information with respect to the chemical nitrogen industry which embraces nitrogen fixed from the air, by-product nitrogen, and the Chilean nitrate industry. Considerable current interest has been expressed in this information, and the Tariff Commission is therefore issuing it for the use of interested parties. Information includes data on the capacity of all countries for producing chemical nitrogen by primary processes as well as by types of process for producing synthetic ammonia. World total annual capacity and production of chemical nitrogen from 1900 through 1934 by primary processes, and the production of chemical nitrogen in the form of major products and by different countries by primary processes from 1924 to 1934 are shown in the series of tables.

The U. S. stands 2nd in capacity for production of synthetically produced nitrogen with 533,200 short tons annually. Germany, of course, is 1st, with a capacity of 1,470,150 tons) and Great Britain 3rd, with 390,500 tons. World capacity (including 690,000 tons annually for Chilean material) is now estimated at 5,082,300 tons.

Senate on Apr. 30th passed the Robinson Price Discriminations Bill (S. 3154) and sent it to the House where similar legislation is pending. Before final passage, the Senate reversed itself by 1st voting down, among other amendments, one offered by Senator Vandenberg (Rep., Mich.) to exempt industrial production from the scope of the bill and later voting to accept the proposal. Senate bill, as passed, would prohibit price discriminations between purchasers of commodities of like grade and quality, ban fictitious promotional allowances, brokerage fees and commissions, and give the Federal Trade Commission authority to limit quantity discounts in certain instances.

Summary of the Principal Provisions of Five Anti-Price Discrimination Bills

Prepared by H. P. Warhust, Bureau of Foreign and Domestic Commerce

Bill	Prohibits unreasonable low selling price	Prohibits discrimination		Provisions for Quantity Price Differentials
		Types prohibited	Purposes and degree prohibited	
H. R. 8442 Patman-Robinson (As of Feb. 3, 1936)		Price, terms of sale, brokerage fees, allowances, discounts, or anything of value.	Where the effects of such discrimination may be substantially to lessen competition or tend to create a monopoly . . . . . or to injure, destroy, or prevent competition.	Federal Trade Commission to fix, establish, and revise quantity price differentials, limiting the maximum quantity price differentials.
H. R. 4995 Mapes (As of Jan. 29, 1935)		Price (directly or indirectly).	. . . . . Unlawful to discriminate unfairly or unjustly in price between different purchasers of commodities.	None.
S. 3670 Borah (As of Jan. 16, 1936)	Unlawful to sell goods (including gas and electricity) at unreasonable low price.	Price or terms of sale. Discounts, rebates, allowances, or advertising services between competitors or districts.	. . . . . (Knowingly) for the purpose of destroying competition or eliminating a competitor.	Forbids discrimination between competitors in sale of goods of like grade, quality, and quantity.
S. 3835 Van Nuys (As of Jan. 30, 1936)	Unlawful to sell goods at unreasonable low price.	Discount, rebate, or allowance. Price. Between competitors or districts.	(Knowingly) . . . . . for the purpose of destroying competition or eliminating a competitor.	None.
H. R. 10486 Utterback (As of Jan. 22, 1936)		Price or terms of sale. Directly or indirectly. Between competitors or districts. Brokerage and commissions, service, anything of value.	Where such discrimination may substantially lessen competition . . . . or may restrain trade or may tend to create a monopoly.	Permit differentials found solely on good faith upon classifications of customers as wholesalers or jobbers, manufacturers or processors, retailers, or consumers. Permits quantity price differentials not in excess of the cost of selling the commodity in question, together with the cost of any service rendered by any such person in connection therewith, as between such purchasers.

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SOA melts at 80-84° to give a tacky adhesive film of valuable properties. It may also be incorporated in other anhydrous adhesives to modify their physical properties; applied to paper from an organic solvent it produces transparency and parchment-appearing surfaces. On heavier stocks, as boxboards, impregnation with SOA gives oil, water, and grease-repellent surfaces.

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Stocks Crash After Spectacular Rise

Sharp Decline in Stock Values Attributed to Adverse Sentiment Towards Administration's Tax Plan on Corporate Surpluses — First Quarter Earnings Statements Satisfactory — Anglo-Chilean Nitrate Plan in Force—

Stock market values crashed during the month of April after having reached a 5-year peak in March. Gains made since the 1st of the year were wiped out as the market reacted unfavorably to the Administration's plan for taxing corporation surpluses. It is difficult to assign any other logical reason for the slump for business activity strangely enough went into new high ground for the past 5 years, surpassing even the pre-code boom of '33.

The net loss on the N. Y. Stock Exchange totalled $3,893,464,991. The chemical group was no exception to the rule and showed a loss of $381,265,857, the value of all stocks in the classification on Apr. 1st being $5,697,259,569 compared to $5,315,993,712 on May 1st. The stock average declined from $72.00 on April 1st to $65.68 on May 1st.

du Pont Earnings Best Since '30

Gains in various divisions of the chemical business and a larger return on its G. M. investment increased du Pont earnings for the 1st quarter of this year to the highest level for such a period since '30.

A preliminary estimate issued by the company indicated net earnings of $1.21 a common share for 3 months, compared with 85c a share in the same quarter last year.

Income in the 1st quarter included a dividend from du Pont's holdings in General Motors equal to 45c on each share of the du Pont common stock. In the 1st quarter of '35 earnings of 85c a common share included return on its investment in G. M. amounting to about 22½c on each share of du Pont.

T. G. S. Earns $1.94 a Share

Report of Texas Gulf Sulphur for year ended Dec. 31st, certified by independent auditors, shows net income of $7,468,017 after depreciation, amortization, provision for contingencies, federal taxes, etc., equivalent to $1.94 a share on 3,840,000 no-par shares of capital stock. This compares with $6,958,476 or $1.81 a share in '34.

Heyden Makes Good Report

Report of Heyden Chemical and subsidiaries for year ended Dec. 31st, certified by independent auditors, shows net profit of $504,831 after depreciation, federal taxes, etc., equivalent after 7% preferred dividend requirements, to $3.22 a share (par $10) on 149,997 shares of common stock, excluding shares in treasury. This compares with $482,646 or $3.07 a common share in '34.

Colum. Carbon Net $2,992,860

Columbian Carbon and subsidiaries for year ended Dec. 31st, certified by independent auditors, shows net profit of $2,992,860 after depreciation, depletion, interest, federal taxes, minority interest, etc., equivalent to $5.56 a share on 537,586 no-par shares of capital stock.

Monsanto Betters '35 Total

In line with the general gain in chemical business in the 1st quarter, Monsanto Chemical showed a net profit slightly higher than a year ago. Report for quarter ended Mar. 31, subject to audit, shows net profit of $1,071,691 after depreciation, federal taxes and other charges, but before subsidiary dividends. After deductions for minority interest and subsidiary preferred dividend requirements there was a balance applicable to the stock of Monsanto Chemical Co. of $1,032,852, equal to $1.03 a share (par $10) on 999,123 shares of capital stock. In March quarter of preceding year the net earnings applicable to the stock of Monsanto Chemical Co. were $925,324, including the undivided earnings of the then controlled subsidiaries, as well as the Swann Corp., which was then controlled but not wholly owned until later in the year. This was equivalent to 96c a share on 959,554 shares, which were outstanding after the exchange of stock for Swann had been consummated.

Dividends and Dates

Name	Div.	Stock Record	Payable
Allied Chem.	$1.50	Apr. 10	May 1
American I. G., "A", extra	$1.00	May 4	May 6
American I. G., "A"	$1.00	May 4	May 6
American I. G., "B", extra	10c	May 4	May 6
American I. G., "B"	10c	May 4	May 6
Am. Smelt. & Rfg.	40c	May 1	May 29
Am. Smelt. & Rfg., 1st pf.	$1.75	Apr. 10	Apr. 30
Am. Smelt. & Rfg., 2nd pf.	$1.50	Apr. 10	Apr. 30
Archer-Daniels-Midland, pf.	$1.75	Apr. 20	May 1
Atlas Powder, pf.	$1.50	Apr. 20	May 1
Bon Ami, Cl. A	$1.00	Apr. 15	Apr. 30
Brit. Celanese, 1st pf.	7%	Apr. 30	.....
Celanese Corp. of Am., 7% pr. pf.	$1.75	June 16	July 1
Celanese Corp. of Am., 7% 1st pt. pf.	$3.50	June 16	June 30
Colgate-Palmolive-Peet	12½c	May 6	June 1
Colgate-Palmolive-Peet, pf.	$1.50	June 5	July 1
Cons. Chem. Ind., Cl. A	37½c	Apr. 15	May 1
Cons. Chem. Ind., Cl. B	12½c	Apr. 15	May 1
Dow Chemical	50c	May 1	May 15
Dow Chemical, pf.	$1.75	May 1	May 15
du Pont, deb.	$1.50	Apr. 10	Apr. 25
Fansteel Metallurgical, pf.	$1.25	June 15	June 30
Fansteel Metallurgical, pf.	$1.25	Sept. 15	Sept. 30
Fansteel Metallurgical, pf.	$1.25	Dec. 15	Dec. 31
Freeport Texas	25c	May 14	June 1
Freeport Texas, pf.	$1.50	July 15	Aug. 1
Freeport Texas, pf.	$1.50	Apr. 15	May 1
Gold Dust	30c	Apr. 10	May 1
Hercules Powder, pf.	$1.75	May 4	May 15
I. C. I. (A.D.R.) Ord.	5½%	Apr. 17	June 8
Int'l Print. Ink	45c	Apr. 13	May 1
Int'l Print. Ink, pf.	$1.50	Apr. 13	May 1
Liq. Carbonic	40c	Apr. 16	May 1
Monsanto, extra	25c	May 15	June 15
Monsanto	25c	May 15	June 15
Nat'l Lead, pf. A	$1.75	May 29	June 15
Nat'l Lead, pf. B	$1.50	Apr. 17	May 1
N. J. Zinc	50c	Apr. 20	May 9
P. & G.	37½c	Apr. 24	May 15
Smith Ag. Chem.	12½c	Apr. 20	May 1
Smith Ag. Chem., pf.	$1.50	Apr. 20	May 1
Solvay Am. Invest., 5½% pf.	$1.37½	Apr. 15	May 15
Tubize-Chatillon, 7% pf.	$3.50	Apr. 10	May 1
United Dyewood	$1.00	May 21	June 1
United Dyewood, pf.	$1.75	June 11	July 1
United Dyewood, pf.	$1.75	Sept. 11	Oct. 1
United Dyewood, pf.	$1.75	Dec. 11	Jan. 1'37

P. P. G. Earnings Rise

Pittsburgh Plate Glass Co., one of the leading factors in flat glass and paint manufacturing field, also a chemical company of 1st importance through its Columbia Alkali and Southern Alkali connections, is rapidly regaining its volume and earning power of pre-depression years. During '35, on an increase in volume of 35.8% over '34 and 89.4% over '32, company practically doubled its '34 earnings. Net profit last year of $11,398,739 was at its 2nd highest point in 10 years, only having been exceeded in that period by the $11,644,833 reported in '29. Net of $11,398,739 after depreciation, depletion, federal taxes, etc., is equivalent to $5.32 a share (par $25) on 2,142,353

Price Trend of Chemical Company Stocks

	Mar. 31	Apr. 3	Apr. 9†	Apr. 17	Apr. 24	Apr. 30	Net gain or loss last month	Price on Apr. 30, 1935	1936 High	1936 Low
Air Reduction	185⅞	187	188¼	188⅝	‡‡59	60	.....	120	61⅞	58
Allied Chemical	199½	205	202	197⅛	187	182	—17½	144	208*	157
Columbian Carbon	112½	120	129¼	127	116¾	107¾	— 4¾	77	134*	94
Com. Solvents	20⅞	21¾	20⅝	19	17⅞	17⅝	— 3¼	19¼	24⅝	17
du Pont	144¼	149½	151¼	147⅝	142	139	— 5¼	96¾	153*	133
Hercules Powder	102	101⅞	101⅞	y102	x97	w90	—12	75	105½	84
Mathieson	32⅛	34	32¾	31¼	29¾	28	— 4⅛	28	36½	27½
Monsanto	101§	100	101¾	98	91¼	94	— 7	66½	103	89¼
Std. of N. J.	64⅞	66	66	64⅝	62	58⅞	— 6	43	70	51⅛
Texas Gulf S.	34¼	34¾	35½	34⅞	35⅛	34¼	.....	30⅞	38¼	33
Union Carbide	81½	84⅝	87¾	85	82¼	77¼	— 4¼	51½	88⅜*	71⅝
U. S. I.	48⅛	56¼	58	52⅞	50¼	47½	— ⅝	41½	59*	39

* New highs in April; † Stock Exchange closed Apr. 10; § Mar. 30; ‡‡ Stock split 3 to one; w Apr. 29; x Apr. 22; y Apr. 16.

shares of capital stock, excluding 30,171 shares in treasury. This compares with $2.69 a share on 2,141,914 shares, in '34.

Duval Net Shows Decline

Report of Duval Texas Sulphur for year ended Dec. 31, '35, certified by independent auditors, shows net income of $78,223 after federal income taxes, depreciation, depletion, etc., equivalent to 15c a share on 500,000 no-par shares of capital stock. For the year ended Aug. 31, '35, net income was $122,472 after taxes and charges, equal to 24c a share. Company has changed its fiscal year to end Dec. 31, instead of Aug. 31st.

A. A. C. Net Below '35

American Agricultural Chemical of Delaware and subsidiaries for 9 months ended Apr. 2nd, shows net profit of $214,264 after taxes, depreciation, depletion, reserve for self-insurance, etc., equivalent to 96c a share on 222,235 no-par shares of capital stock, excluding shares in treasury. This compares with $396,262 or $1.73 a share on 228,208 shares in the 9 months ended Mar. 28, '35.

For quarter ended Apr. 2nd, last, indicated net profit (based on a comparison of company's reports for the 6 and 9 months periods) was $311,980 after taxes and charges, equal to $1.40 a share on 222,235 shares comparing with $11,884 or 5c a share on 222,235 shares in preceding quarter and $521,494 or $2.28 a share on 228,208 shares in corresponding quarter of previous year.

United Dyewood's Sharp Gain

Report of United Dyewood and subsidiaries for year ended Dec. 31, '35, certified by independent auditors, shows net income of $403,874 after depreciation, federal and foreign income and dividend taxes, minority interest, etc., equivalent after 7% preferred dividends, to $1.38 a share (par $10) on 139,183 shares of common stock. This compares with $220,293 or 1c a common share in '34.

Report of American Commercial Alcohol and wholly-owned subsidiaries for year ended Dec. 31, '35, certified by independent auditors, shows profit, before deducting a provision of $620,000 for estimated unrealized profit on sales subject to deferred delivery, of $823,412 after interest, provision for doubtful accounts, depreciation, federal taxes, etc. This is equivalent to $3.15 a share (par $20) on 260,879 common shares. After deducting $620,000 provision for estimated unrealized profit on sales subject to deferred delivery, net profit carried to earned surplus was $203,412, equivalent to 78c a common share. In '34 company reported net profit of $930,937 or $3.57 a common share.

Nitrate Plan in Operation

Plan dated Jan. 27, '36, for the readjustment of the financial structure of Anglo-Chilean Nitrate has been declared operative, according to an announcement by Medley G. B. Whelpley, president of the company, to holders of certificates of deposit for the 20-year 7% debentures. More than 69% of the debentures have been deposited under the plan, according to Mr. Whelpley, and the company now is in a position to proceed with the necessary steps under the statutes of the Republic of Chile. Upon satisfactory completion of these proceedings the new sinking fund income debentures, due Jan. 1, 1967, will be made available to holders of the certificates of deposit.

Westlake Views '36 Prospects

Higher copper prices in '36, compared with the average for '35, together with prospects for even higher prices this year, will benefit Tennessee Corp.'s earnings, E. H. Westlake, vice president, told stockholders at the annual meeting. He pointed out that the domestic copper price, although improved, is still at the lowest levels since 1895, with exception of the depression years. The fertilizer business in South and Middle West has been retarded seriously by inclement weather, Mr. Westlake stated, in addition to price instability in the South. As a result, net earnings of Tennessee Corp. for the 1st 3 months this year probably will be lower than in the corresponding 1935 period.

Westvaco Declares Extra

Westvaco Chlorine Products declared an extra dividend of 10c and the regular quarterly dividend of 10c on the common stock, both payable in June to stock of record May 15.

Glidden's New Issue

Glidden plans to issue 200,000 shares of a new $50 par convertible 4½% preferred stock and call the present outstanding $100 par 7% prior preference stock.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1936	Net income 1935	Common share earnings 1936	Common share earnings 1935	Surplus after dividends 1936	Surplus after dividends 1935
Air Reduction:							
g March 31 quarter	§$3.00	$1,430,231	$1,254,008	$1.70	$1.50	*.....	*.....
Archer-Daniels-Midland:							
††March 31 quarter	$1.00	412,203	560,054	.65	.92	*.....	*.....
Nine months, March 31	$1.00	1,220,816	1,759,099	1.92	2.90	*.....	*.....
Atlas Powder:							
March 31 quarter	$2.00	355,136	245,335	1.01	.48	.....	.....
Twelve months, March 31	$2.00	1,270,970	*.....	3.34	....	.....	.....
Bon Ami:							
March 31 quarter	*b*$2.00	245,556	222,147	*b*.70	*b*.65	.....	.....
Certain-teed Products:							
March 31 quarter	*f*....	†276,967	†132,349	....	....	.....	.....
Consolidated Chemical Industries:							
March 31 quarter	....	106,888	115,045	*a*.45	*a*.51	.....	.....
du Pont de Nemours:							
March 31 quarter	$3.60	14,713,782	11,097,142	*j*1.21	*j*.85	$3,119,823	$2,273,336
General Printing Ink:							
March 31 quarter	*w*.50	291,554	216,097	1.30	.88	.....	.....
Hercules Powder:							
March 31 quarter	$3.00	805,101	797,060	1.12	1.05	.....	.....
Industrial Rayon:							
March 31 quarter	1.68	198,616	296,301	*h*.32	*h*.49	.....	.....
International Printing Ink:							
g March 31 quarter	1.80	242,801	209,507	*h*.54	*h*.48	.....	.....
g Twelve months, March 31	1.80	1,114,051	*.....	2.67	*....	.....	.....
Lindsay Light & Chemical:							
March 31 quarter	*w*.05	7,655	19,345	.06	.26	.....	.....
Mathieson Alkali:							
March 31 quarter	1.50	289,692	350,180	.30	.37	*.....	*.....
Monsanto Chemical:							
March 31 quarter	$1.00	1,032,852	925,324	1.03	.96	.....	.....
Newport Industries:							
March 31 quarter	*f*....	67,439	67,564	....	....	.....	.....
Twelve months, March 31	*f*....	294,992	151,605	....	....	.....	.....
Penn. Salt:							
Twelve months, March 31	$3.00	1,168,662	729,586	7.79	4.86	.....	.....
Procter & Gamble:							
March 31 quarter	1.50	4,010,510	4,050,443	.59	.60	*.....	*.....
Nine months, March 31	1.50	11,893,873	11,594,466	1.76	1.71	*.....	*.....
Texas Gulf Sulphur:							
March 31 quarter	2.00	2,149,018	1,540,869	.56	.40	229,018	*d*379,131
Twelve months, March 31	2.00	8,076,166	*.....	2.10	....	.....	.....
Union Carbide & Carbon:							
March 31 quarter	*w*.50	7,502,393	5,293,629	.83	.59	*.....	*.....

		1935	1934	1935	1934	1935	1934
Allied Chemical & Dye:							
Year, December 31	6.00	21,701,275	17,548,355	8.71	6.83	5,997,901	1,844,981
American Maize-Products:							
Year, December 31	*k*1.00	60,586	545,085	.20	1.81	.....	.....
Continental-Diamond Fibre:							
Year, December 31	*k*1.05	167,677	†99,710	.37	....	.....	.....
Union Carbide & Carbon:							
Year, December 31	2.00	27,254,249	20,277,442	3.03	2.25	12,118,914	8,703,363
United Dyewood:							
Year, December 31	*w*1.00	403,874	220,293	1.38	.01	191,792	1,487

* Not available. † Net loss. § Plus extras. †† Indicated quarterly earnings as shown by comparison of company's report for 6 and 9 months period. *a* On Cl. A stock. *b* On Cl. B shares. *d* Deficit. *f* No common dividend. *g* Report subject to audit and year end adjustment. *h* On shares outstanding at close of respective periods. *j* On average shares. *k* Paid in '35. *w* Last dividend declared; period not announced by company.

Cellulose Acetate
Cresylic Acid
Sodium Acetate
Acetic Anhydride
Casein
Dibutyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate
Triphenyl Phosphate
Triacetin

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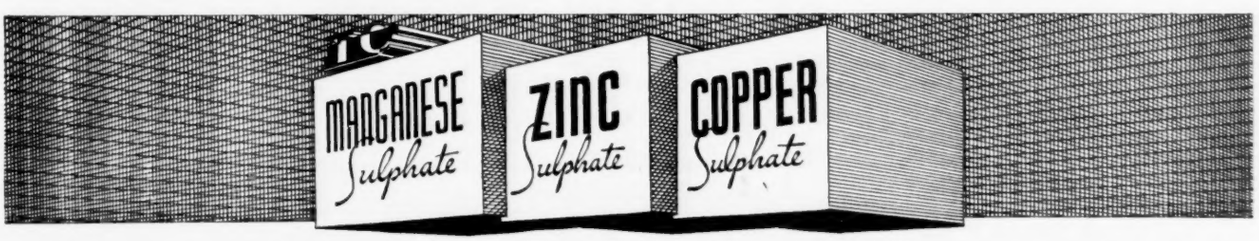

TENNESSEE CORPORATION
ATLANTA, GEORGIA—LOCKLAND, OHIO : IN FLORIDA, U. S. PHOSPHORIC CORP., TAMPA

Chemical Stocks and Bonds

Last	1936 April High	Low	1935 High	Low	1934 High	Low	Sales	Stocks	Par $	Shares Listed	An. Rate*	Earnings $-per share-$ 1935	1934
							Number of shares April 1936	1936					
NEW YORK STOCK EXCHANGE													
60	64¾	56¼	57½	35	37⅝	30⅝	19,400	48,400	Air Reduction	No	2,523,864	....	2.10	1.66
182	208	157	173	125	160¾	115⅛	17,800	172,500	Allied Chem. & Dye	No	2,214,099	$6.00	8.71	6.83
50	63¼	50	57¾	41½	48	25¼	7,600	48,800	Amer. Agric. Chem.	100	315,701	2.00	....	*p*6.37
24	32⅝	23⅜	35¼	22½	62½	20¾	22,200	150,700	Amer. Com. Alcohol	20	260,716	None	3.16	3.57
37	50	37	52	36	39⅛	26¼	4,700	35,400	Archer-Dan-Midland	No	541,546	1.50	.....	*p*4.21
60	73	48	48½	32¾	55½	35¼	3,300	22,900	Atlas Powder Co.	No	234,235	2.25	2.81	2.49
125	126¼	112	115	106¾	106¾	83	300	3,290	6% cum. pfd.	100	88,781	6.00	16.93	13.54
23¼	32¼	22½	35⅜	19½	44⅞	17⅛	84,700	487,700	Celanese Corp. Amer.	No	987,800	.50	1.99	1.25
16¼	20½	16⅜	21	15⅛	18⅛	9⅜	38,100	206,500	Colgate-Palm.-Peet	No	1,985,812	.75	1.36	1.16
103¾	106½	102½	107¼	101	102½	68½	1,400	5,200	6% pfd.	100	254,500	6.00	16.79	16.14
107¾	134	94	101¼	67	77¼	58	16,100	63,400	Columbian Carbon	No	538,154	4.00	5.56	3.93
17⅝	24⅝	17	23⅞	16½	36¾	15¾	171,600	1,161,100	Commer. Solvents	No	2,635,371	.60	1.02	.89
71¾	78½	68½	78⅜	60	84½	55½	73,400	248,500	Corn Products	25	2,530,000	3.00	2.62	3.16
167	168½	162	165	148¾	150½	135	400	2,600	7% cum. pfd.	100	243,739	7.00	33.97	39.65
49½	58	42	50⅜	35½	55¼	29	4,900	32,400	Devoe & Rayn. A	No	95,000	2.00	.....	2.36
139	153	133	146½	86⅝	103⅞	80	46,900	165,600	DuPont de Nemours	20	10,871,997	3.60	5.04	3.63
130	133⅛	129	132	126⅞	128½	115	3,400	10,000	6% cum. deb.	100	1,092,699	6.00	56.94	42.73
156¾	170½	156	172¼	110½	116½	79	14,600	48,300	Eastman Kodak	No	2,250,921	5.75	6.90	6.28
162	166	158	164	141	147	120	280	930	6% cum. pfd.	100	61,657	6.00	258.09	235.22
30	35⅝	28½	30⅝	17¼	50⅜	21½	27,600	181,400	Freeport Texas	10	784,664	1.00	1.78	1.76
125	135	125	125	112½	160⅛	113½	80	780	6% conv. pfd.	100	25,000	6.00	121.30	120.08
45¾	55¼	44½	49½	23⅜	28⅜	15⅝	40,100	146,700	Glidden Co.	No	603,304	2.00	.....	*x* 2.91
106	114½	105⅜	111	104⅞	107½	83	3,460	6,080	7% pfd.	100	63,044	7.00	.....	*x*40.70
125	133	120	119½	85	96⅞	74	700	9,100	Hazel Atlas	25	434,409	5.00	7.58	5.21
90	105½	84	90	71	81⅝	59	1,500	28,000	Hercules Powder	No	582,679	3.50	4.23	3.94
133	133¼	128	131	122	125¾	111	440	2,010	7% cum. pfd.	100	105,765	7.00	36.30	28.79
28⅜	34⅝	27¾	36⅜	23½	32	19⅜	85,100	200,300	Industrial Rayon	No	600,000	1.68	1.00	2.23
3⅜	5⅞	3¼	5	2⅝	6⅛	2	23,100	239,300	Intern. Agricul.	No	436,049	None	.....	*p*—.99
28	41	27¾	42¾	26	37¼	15	5,400	43,300	7% cum. pr. pfd.	100	100,000	None	.....	*p*2.69
45½	54¼	44	47¼	22¼	29¼	21	123,500	916,300	Intern. Nickel	No	14,584,025	1.00	1.65	1.14
23	29¼	23	36¼	25	32	21	4,100	15,300	Intern. Salt	No	240,000	1.50	1.32	2.02
30	36¾	29¾	36¼	31	33⅛	15¾	700	14,300	Kellogg (Spencer)	No	500,000	1.60	.....	*v*2.22
49⅝	63⅛	47¼	49¼	21½	43⅞	22½	33,500	307,100	Libbey Owens Ford	No	2,559,042	2.00	3.26	1.25
35½	44¾	35½	37¼	24½	35⅜	16⅛	23,500	83,600	Liquid Carbonic	No	342,406	1.60	.....	*v*2.58
28	36½	27½	33⅞	23¾	40¾	23½	24,200	154,000	Mathieson Alkali	No	650,436	1.50	1.44	1.20
94	103	89¼	94¾	55	61⅝	39	8,700	44,900	Monsanto Chem.	10	864,000	1.25	3.84	3.03
260	305	204	206	145	170	135	1,700	10,225	National Lead	100	309,831	5.00	10.78	8.38
160	162½	150	162½	150	146½	122	300	700	7% cum. "A" pfd.	100	243,676	7.00	25.40	20.12
141½	143	137¾	140½	121⅝	121½	100½	260	1,990	6% cum. "B" pfd.	100	103,277	6.00	49.05	35.36
9¾	13¾	9⅛	10⅞	4⅜	13	5½	47,700	411,000	Newport Industries	1	519,347	None	.57	.31
141	164	128	129	80	94	60	9,300	64,500	Owens-Illinois Glass	25	1,200,000	5.00	6.52	5.41
42⅞	49	42	53¾	42⅜	44⅜	33⅛	25,000	108,800	Procter & Gamble	No	6,410,000	1.70	.....	*p* 2.23
118½	122½	117¾	121	115	117	102½	230	1,540	5% pfd. (ser. 2-1-29)	100	171,569	5.00	.....	*p*88.13
6¾	10¼	5⅝	8¾	4	6¾	3⅛	31,200	283,700	Tenn. Corp.	5	857,896	None	.22	.27
34¼	38¾	33	36¾	28¾	43¼	30	35,200	245,600	Texas Gulf Sulphur	No	2,540,000	2.00	1.94	1.81
77¼	88⅜	71⅝	75¾	44	50⅞	35⅞	53,400	326,600	Union Carbide & Carbon	No	9,000,743	2.00	3.06	2.28
72¼	79¼	68	78	46	50⅜	35	16,200	63,900	United Carbon	No	370,127	2.40	4.71	3.55
47½	59	39	50⅝	35⅛	64¾	32	152,300	374,700	U. S. Indus. Alco.	No	391,033	2.00	2.16	4.04
17⅞	27¼	17½	21¾	11¼	31¾	14	32,300	253,800	Vanadium Corp.-Amer.	No	366,637	None	—1.13	—2.29
5¼	8⅜	4⅛	4⅝	2½	5⅜	1⅞	27,800	279,100	Virginia-Caro. Chem.	No	486,000	None	.....	*p*—.79
34	48¾	32	35¾	17½	26	10	17,100	167,600	6% cum. part. pfd.	100	213,392	None	.....	*p*4.20
111¾	114	109	120½	85	84	59¾	1,400	8,100	7% cum. prior pfd.	100	60,000	8.00	.....	*p*23.50
21¾	28½	21¼	25½	16¾	27¼	14⅞	6,500	55,000	Westvaco Chlorine	No	284,962	.40	1.63	1.55
NEW YORK CURB EXCHANGE														
32½	40¾	29¼	30	15	22½	14⅝	33,900	243,400	Amer. Cyanamid "B"	No	2,404,194	.60	1.61	.99
2¾	3¾	2¾	4	2	4⅛	2⅜	800	8,200	British Celanese Am. R.	10	2,806,000	None	.....	.....
101	116¼	101	115	90	105¼	81	1,775	5,125	Celanese, 7% cum. 1st pfd.	100	144,379	7.00	21.96	16.37
109	116	107¼	111¼	97½	102	83	1,125	3,425	7% cum. prior pfd.	100	213,668	7.00	35.34	28.13
11	16½	10½	15	7	19	7	300	2,950	Celluloid Corp.	15	194,952	None	—.95	—1.67
13	15	13	14½	11⅝	14⅜	10½	300	2,400	Courtaulds' Ltd.	1 £	24,000,000	7½%	.....	7.57%
100	124¾	94⅛	105½	80½	91	67½	6,100	29,300	Dow Chemical	No	945,000	2.00	.....	3.32
7⅜	10¾	7	12½	6¼	10¾	4	8,800	37,000	Duval Texas Sulphur	No	500,000	None	.16	*z* .25
43¾	55	43½	58	37	40¾	19	300	3,800	Heyden Chem. Corp.	10	147,600	1.50	3.22	3.07
111	140	98¼	97¼	46¾	57½	39	6,300	34,540	Pittsburgh Plate Glass	25	2,141,305	3.00	5.32	2.69
125¾	145½	118½	128⅞	84	90½	47¼	3,600	37,450	Sherwin Williams	25	635,583	4.00	.....	*y*6.19
114¾	116	110¾	113¼	106	109¾	100	290	3,250	5% pfd. cum.	100	155,521	5.00	.....	*y*33.17
PHILADELPHIA STOCK EXCHANGE														
126½	130	114¼	116¼	76½	75	50¼	550	1,420	Pennsylvania Salt	50	150,000	4.00	*w*7.79	*w*4.86

Last	1936 April High	Low	1935 High	Low	1934 High	Low	Sales	Bonds	Date Due	Int. %	Int. Period	Out-standing $
NEW YORK STOCK EXCHANGE							April 1936	1936				
112	117½	112	116	104½	106¾	83⅞	224,000	1,653,000	Amer. I. G. Chem. Conv. 5½'s	1949	5½	M. N.	29,929,000
23⅜	30⅜	23½	29¾	7⅜	17¾	5	129,000	1,661,000	Anglo Chilean s. f. deb. 7's	1945	7	M. N.	12,700,000
95	101¾	92½	94½	77⅜	88	61½	54,000	505,000	By-Products Coke Corp. 1st 5½'s "A"	1945	5½	M. N.	4,932,000
99⅝	102¾	99	100¼	91⅛	92	62	36,000	319,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M. N.	5,994,100
23	27¼	21	21½	7	19½	5⅛	561,000	5,484,000	Lautaro Nitrate conv. b's	1954	6	J. J.	31,357,000
86½	88	66½	94	65	98½	89⅞	66,000	217,000	Montecatini Min & Agric. deb. 7's with war.	1937	7	J. J.	7,075,045
29⅛	35	29⅛	38	32⅛	74½	34½	10,000	29,000	Ruhr Chem. 6's	1948	6	A. O.	3,156,000
103¾	105	103	104	91½	90	65¾	71,000	216,000	Tenn. Corp. deb. 6's "B"	1944	6	M. S.	3,007,900
90½	95¾	87	94⅛	66	89½	62	70,000	465,000	Vanadium Corp. conv. 5's	1941	5	A. O.	4,261,000

† Year ended 5-31-35; *p* Year ended 9-30-35; *v* Year ended 8-1-35; *y* Year ended 8-31-35; *z* Year ended 8-31-35; * Including extras; *x* Year ended 10-31-35; *w* Years ended 3-31-35 and 3-31-36.

Industrial Trends

Business Reaches 6-Year Peak in April in the Face of a Sharply Declining Stock Market—Steel Activity at Better Than 70 Per Cent. of Capacity—Wholesale Commodity Prices Slightly Lower—

Business in April was at a 6-year peak despite several adverse factors, including a sharp decline in the stock market which practically wiped out the gains registered since the turn of the year. The traditional belief that presidential years are poor business years does not seem to be holding true, for with the major conventions but a few weeks away, business activity is at the highest point since the early spring of 1930. The decline in stock values is thought to be largely the direct result of the Administration's proposed tax plan on corporation surpluses which has passed the House and now goes to the Senate. Industry is bitterly opposed for it is feared that the measure will seriously retard further gains in recovery. Several of the important commodity markets followed the general trend downward, but taking the picture as a whole, most business indices show that the pre-code boom level of '33 has been exceeded.

The present upward surge is being led by the steel industry which is currently operating at better than 70% of capacity. Automobile production continued at a high peak during the past month. It is being freely predicted in Detroit that May production will reach 500,000 units as against only 384,000 during May of last year and that assemblies at the rate of 100,000 a week will continue well into June.

Retail sales during April made the best comparative showing for the year to date, the rise over last year running from 4 to 10%. Wholesale trade is correspondingly active, the gain generally being around 15%. The immediate outlook over the next few months in both divisions of trade is favorable, particularly so because of the nearness of the payment of the soldiers' bonus.

Carloadings are again showing appreciable gains over the corresponding weeks of last year, while the sharp gains in electrical consumption have been the subject of wide discussion. Commodity price indices show slight losses for the month, due largely to declines in the grain markets and in cotton.

Most of the manufacturing industries reported substantial seasonal gains in April. A great deal of the backlog, caused by the severe winter weather, floods, and cyclones, is now augmenting the usual spring uplift in business. Paint manufacturers, late in starting, are now expecting to approach '29 totals as the construction industry, specially in the field of housing, is finally experiencing something akin to a baby boom. Glass production is at a high peak as a result of the demands of the building field and the call for safety glass in the automotive industry. The latter is also responsible for much heavier production schedules in the Akron tire factories where the labor situation has cleared up temporarily at least. The textile manufacturing sections are more active. Rayon continues to be the particularly bright spot in this group. Tanning operations are somewhat disappointing for this time of the year. Shoe manufacturers are proceeding with caution because of the record-breaking figures of last year and the belief that dealer stocks must be rather large, but this condition is considered but temporary. Paper production figures are encouraging, but manufacturers, specially those in the newsprint field, complain about the prevalence of very low prices. The mixed fertilizer season is now under way after a late start, but while tonnages are satisfactory, the old problem of price-cutting is again a major one.

As a result of the gains in industries consuming chemicals in large quantities, the production schedules of most industrial chemical manufacturers were expanded during April and a continuance of this pace is expected to hold through May. Earnings statements of the leading companies for the 1st quarter show substantial improvement over the 1st quarter of '35, and if the rate of activity now prevailing holds through May and part of June, the 2nd quarter figures should prove highly acceptable.

The disappointing angle is the small decrease reported in the unemployed. Disquieting, too, is the adverse legislation at Washington. The month long decline in the stock market was completely out of harmony with the business trend and prospects and reflects the feeling of at least a great many on the subject of taxing corporate surpluses in the manner laid down in the present measure. The political pot is beginning to boil and from now on this angle of the highly complex situation will assume an even greater importance than heretofore.

Statistics of Business

	March 1936	March 1935	February 1936	February 1935	January 1936	January 1935
Automotive production	323,160	280,758	218,270	220,162	276,350	204,015
Bldg. contracts*‡	$199,028	$122,941	$142,050	$75,047	$204,793	$99,774
Failures, Dun & Bradstreet	.....	.....	856	971	1,077	1,146
Merchandise imports‡	$200,295	$177,356	$192,821	$152,491	$185,408	$168,482
Merchandise exports‡	$195,336	$185,026	$182,630	$162,999	$195,564	$173,560
Newsprint Production						
Canada, tons	243,900	205,682	221,569	180,305	227,955	201,959
U. S., tons	76,507	73,528	72,252	70,805	79,361	80,666
Newfoundland, tons	24,095	28,399	24,047	24,604	26,348	28,012
Mexico, tons	.....	1,992	171	1,743	171	2,066
Total, tons	344,502	309,595	318,039	277,457	333,835	312,703
Plate glass prod., sq. ft.	16,057,196	16,531,950	13,856,937	13,723,151	17,275,632	13,265,188
Steel ingots production, tons	3,346,489	2,868,141	2,967,803	2,777,765	3,049,439	2,871,531
Steel activity, % capacity	58.65	49.83	54.09	52.28	z51.46	48.04
Pig iron production, tons	2,040,311	1,770,028	1,827,972	1,608,552	2,025,885	1,447,336
U. S. consumption, crude rubber, tons	42,703	42,620	36,746	43,187	48,506	47,103
Tire shipments	.....	.....	.....	.....	3,874,764	3,662,615
Tire production	.....	.....	.....	.....	4,578,710	4,626,473
Tire inventory	.....	.....	.....	.....	8,918,177	10,397,667
Dept. of Labor Indices†						
Factory payrolls, totals†	75.7	70.8	72.3	69.1	72.2	z64.3
Factory employment†	84.2	82.5	83.2	81.4	z83.0	z78.8
Chemical employment†a	113.2	113.9	109.1	109.4	z109.7	108.2
Chemical payrolls†a	102.3	96.0	97.5	93.2	97.9	90.5
Chemicals and Related Products						
Exports‡	$10,608	$9,286	$8,959	$7,503	$9,096	$7,767
Imports‡	$7,327	$7,082	$7,849	$6,108	$5,955	$6,738
Stocks, mfd. goods	.....	.....	128	122	124	115
Stocks, raw materials†	.....	.....	89	98	98	107
Cement prod., ratio of prod. to capacity	23.4	18.9	16.4	14.9	16.1	14.1
Anthracite prod., tons	y2,741,000	3,082,000	6,461,000	4,505,000	y5,129,000	5,691,000
Bituminous prod., tons	y30,692,000	38,701,000	41,375,000	34,834,000	y36,600,000	34,681,000

Week Ending	Carloadings 1936	Carloadings 1935	Carloadings % of Change	Electrical Output§ 1936	Electrical Output§ 1935	Electrical Output§ % of Change	Jour. of Com. Price Index	National Fertilizer Association Indices ‡‡Labor Dept. Chem. & Drugs	Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups	Chem. & Drug Price Index	% Steel Activity	N. Y. Times Index Bus. Act.	Fisher's Index Pur. Power
Mar. 28	600,487	616,520	— 2.6	1,867,093	1,712,863	+ 9.0	79.0	94.2	75.5	65.3	71.4	77.0	79.1	53.7	93.8	121.1
Apr. 4	613.867	545,456	+ 3.0	1,916,486	1,700,334	+12.7	78.6	94.2	74.0	65.1	71.4	76.7	79.1	62.0	97.3	121.2
Apr. 11	622,138	586,568	+ 6.1	1,933,610	1,725,352	+12.1	79.6	94.2	75.0	65.2	71.5	76.9	79.0	64.5	98.7	121.3
Apr. 18	642,697	611,141	+ 5.2	1,914,710	1,701,945	+12.5	80.3	94.4	72.7	65.7	67.4	76.8	78.9	67.9	98.2	121.0
Apr. 25	666,181	558,836	+19.2	1,932,797	1,673,295	+15.5	80.3	94.4	72.0	65.7	67.4	76.7	78.2	70.4	99.1	121.2
May 2	.....	.....	.....	.....	.....	.....	79.3	....	....	....	....	....	....	71.2	....	121.6

* 37 states; † Dept. of Labor, 3 year average, 1923-1925 = 100.0; ‡ 000 omitted; § K.W.H., 000 omitted; a Includes all allied products but not petroleum refining; ‡‡ 1926-1928 = 100.0; y Preliminary; z Revised.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1935 Average $1.21 - Jan. 1935 $1.23 - April 1936 $1.21

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Acetaldehyde, drs, c-l, wgs lb.	...	.14	...	.14	...	.14
Acetaldol, 95%, 50 gal drs wks .....lb.	.21	.25	.21	.25	.21	.25
Acetamide, tech, lcl, kegs..lb.	.38	.43	.38	.43	.38	.43
Acetanalid, tech, 150 lb bbls lb.	.24	.26	.24	.26	.24	.26
Acetic Anhydride, 100 lb cbys .....lb.	.21	.25	.21	.25	.21	.25
Acetin, tech, drs .....lb.	.22	.24	.22	.24	.22	.24
Acetone, tks, delv .....lb.	...	.08½	.08½	.12	.11	.12
drs, c-l, delv .....lb.	...	.09½	.09½	.12	...	.12
Acetyl chloride, 100 lb cbys lb.	.55	.68	.55	.68	.55	.68
ACIDS						
Abietic, kgs, bbls .....lb.	.06¾	.07	.06¾	.07	.06¾	.07
Acetic, 28%, 400 lb bbls, c-l, wks .....100 lbs.	...	2.45	...	2.45	2.40	2.45
glacial, bbls, c-l, wks 100 lbs.	...	8.43	...	8.43	8.25	8.43
glacial, USP, bbls, c-l, wks .....100 lbs.	...	12.43	...	12.43	12.25	12.43
Adipic, kgs, bbls .....lb.	...	.72	...	.72	...	.72
Anthranilic, refd, bbls ....lb.	.85	.95	.85	.95	.85	.95
tech, bbls .....lb.	...	.75	...	.75	...	.75
Battery, cbys, delv ...100 lbs.	1.60	2.25	1.60	2.25	1.60	2.25
Benzoic, tech, 100 lb kgs ..lb.	.40	.45	.40	.45	.40	.45
USP, 100 lb kgs .....lb.	.54	.59	.54	.59	.54	.59
Boric, tech, gran, 80 tons, bgs, delv .....ton *a*	...	95.00	...	95.00	80.00	95.00
Broenner's, bbls .....lb.	1.20	1.25	1.20	1.25	1.20	1.25
Butyric, 95%, cbys .....lb.	.53	.60	.53	.60	.53	.60
edible, c-l, wks, cbys ...lb.	1.20	1.30	1.20	1.30	1.20	1.30
synthetic, c-l, drs .....lb.	...	.22	...	.22	...	.22
wks .....lb.	...	.23	...	.23	...	.23
tks, wks .....lb.	...	.21	...	.21	...	.21
Camphoric, drs .....lb.	...	5.25	...	5.25	...	5.25
Chicago, bbls .....lb.	...	2.10	...	2.10	...	2.10
Chlorosulfonic, 1500 lb drs, wks .....lb.	.03½	.05	.03½	.05	.03½	.05½
Chromic, 99¾%, drs, delv lb.	.14¾	.16¾	.14¾	.16¾	.13¾	.16¾
Citric, USP, crys, 230 lb bbls .....lb. *b*	.27	.28	.27	.29	.28	.29
anhyd, gran, drs .....lb. *b*	...	.30	.30	.31	...	.31
Cleve's, 250 lb bbls .....lb.	.52	.54	.52	.54	.52	.54
Cresylic, 99%, straw, HB, drs, wks, frt equal ..gal.	.58	.59	.51	.59	.46	.53
99%, straw, LB, drs, wks, frt equal .....gal.	.68	.70	.68	.70	.64	.68
resin grade, drs, wks, frt equal .....gal.	.58	.59	.52	.59	.52	.55
Crotonic, drs .....lb.	.90	1.00	.90	1.00	.90	1.00
Formic, tech, 140 lb drs ..lb.	.11	.13	.11	.13	.11	.13
Fumaric, bbls .....lb.	...	.60	...	.60	...	.60
Fuming, see Sulfuric (Oleum)						
Fuoric, tech, 90%, 100 lb drs .....lb.	...	.35	...	.35	...	.35
Gallic, tech, bbls .....lb.	.65	.68	.65	.68	.65	.68
USP, bbls .....lb.	.70	.80	.70	.80	.70	.80
Gamma, 225 lb bbls, wks..lb.	.80	.84	.80	.84	.77	.79
H, 225 lb. bbls, wks.....lb.	.50	.55	.50	.55	.50	.55
Hydriodic, USP, 10% sol. cbys .....lb.	.50	.51	.50	.51	.50	.51
Hydrobromic, 48% com 155 lb cbys, wks .....lb.	.45	.48	.45	.48	.45	.48
Hydrochloric, see muriatic.						
Hydrocyanic, cyl. wks ....lb.	.80	1.30	.80	1.30	.80	1.30
Hydrofluoric, 30%, 400 lb bbls, wks .....lb.	.07	.07½	.07	.07½	.07	.07½
Hydrofluosilicic, 35%, 400 bbls, wks .....lb.	.11	.12	.11	.12	.11	.12
Lactic, 22%, dark, 500 lb. bbls .....lb.	.04½	.05	.04½	.05	.04½	.05
22%, light refd, bbls ...lb.	.06½	.07	.06½	.07	.06½	.07
44%, light, 500 lb bbls ..lb.	.11½	.12	.11½	.12	.11½	.12
44%, dark, 500 lb bbls ..lb.	.09½	.10	.09½	.10	.09½	.10
50%, water white, 500 lb bbls .....lb.	...	.14½	...	.14½	...	...
USP X, 85%, cbys ....lb.	.45	.50	.45	.50	.45	.50
Laurent's, 250 lb bbls ....lb.	.46	.47	.46	.47	.36	.37
Linoleic, bbls .....lb.	.16	.16	.16	.16	.16	.16
Maleic, powd, kgs .....lb.	.29	.32	.29	.32	.29	.32
Malic, powd, kgs .....lb.	.45	.60	.45	.60	.45	.60
Metanillic, 250 lb bbls ....lb.	.60	.65	.60	.65	.60	.65
Mixed, tks, wks .....N unit	.06½	.07¼	.06½	.07¼	.06½	.07¼
S unit	.008	.009	.008	.009	.008	.009
Monochloracetic, tech, bbls lb.	.16	.18	.16	.18	.16	.18
Monosulfonic, bbls .....lb.	1.50	1.60	1.50	1.60	1.50	1.60
Muriatic, 18°, 120 lb cbys, c-l, wks .....100 lb.	...	1.35	...	1.35	...	1.35
tks, wks .....100 lb.	...	1.00	...	1.00	...	1.00
Muriatic (cont.):						
20°, cbys, c-l, wks ..100 lb.	...	1.45	..	1.45	...	1.45
tks, wks .....100 lb.	...	1.20	...	1.20	...	1.20
22°, c-l, cbys, wks ..100 lb.	...	1.95	...	1.95	...	1.95
tks, wks .....100 lb.	...	1.60	...	1.60	...	1.60
CP, cbys .....lb.	.06½	.07½	.06½	.07½	.06½	.07½
N & W, 250 lb bbls .....lb.	.85	.87	.85	.87	.85	.87
Naphthenic, 240-280 s. v., drs .....lb.	.11	.14	.11	.14	.11	.14
Sludges, drs .....lb.	.06	.10	.06	.10	...	...
Naphthionic, tech, 250 lb bbls .....lb.	.60	.65	.60	.65	.60	.65
Nitric, 36°, 135 lb cbys, c-l, wks .....100 lb. *c*	...	5.00	...	5.00	...	5.00
38°, c-l, cbys, wks..100 lb. *c*	...	5.50	...	5.50	...	5.50
40°, cbys, c-l, wks..100 lb. *c*	...	6.00	...	6.00	...	6.00
42°, c-l, cbys, wks..100 lb. *c*	...	6.50	...	6.50	...	6.50
CP, cbys, delv.....lb.	.11½	.12½	.11½	.12½	.11½	.12½
Oxalic, 300 lb bbls, wks, or N. Y. .....lb.	.11½	.12½	.11½	.12½	.11½	.12½
Phosphoric, 50%, USP, cbys .....lb.	.14	.14	.14	.14	.14	.14
50%, acid, c-l, drs, wks..lb.	.06	.08	.06	.08	.06	.08
75%, acid, c-l, drs, wks..lb.	.09	.10½	.09	.10½	.09	.10½
Picramic, 300 lb bbls, wks.lb.	.65	.70	.65	.70	.65	.70
Picric, kgs, wks .....lb.	.30	.40	.30	.40	.30	.40
Propionic, 98% wks, drs..lb.	...	.35	...	.35	...	.35
80% .....lb.	.15	.17½	.15	.17½	.15	.17½
Pyrogallic, crys, kgs, wks..lb.	1.55	1.65	1.55	1.65	1.55	1.65
Salicylic, tech, 125 lb bbls, wks .....lb.	...	.40	...	.40	...	.40
Sebacic, tech, drs, wks ....lb.	...	.58	...	.58	...	.58
Succinic, bbls .....lb.	...	.75	...	.75	...	.75
Sulfanilic, 250 lb bbls, wks lb.	.18	.19	.18	.19	.18	.19
Sulfuric, 60°, tks, wks ..ton	...	11.00	...	11.00	...	11.00
c-l, cbys, wks ....100 lb.	...	1.10	...	1.10	...	1.10
66°, tks, wks .....ton	...	15.50	...	15.50	...	15.50
c-l, cbys, wks ....100 lb.	...	1.35	...	1.35	...	1.35
CP, cbys, wks .....lb.	.06½	.07½	.06½	.07½	.06½	.07½
Fuming (Oleum) 20% tks, wks .....ton	...	18.50	...	18.50	...	18.50
Tannic, tech, 300 lb bbls...lb.	.23	.40	.23	.40	.23	.40
Tartaric, USP, gran powd, 300 lb bbls .....lb.	...	.24	...	.24	.24	.25
Tobias, 250 lb bbls .....lb.	.70	.72½	.70	.72½	.70	.80
Trichloroacetic bottles ....lb.	2.45	2.75	2.45	2.75	2.45	2.75
kgs .....lb.	...	1.75	...	1.75	...	1.75
Tungstic, tech, bbls .....lb.	1.50	1.60	1.50	1.60	1.50	1.60
Vanadic, drs, wks .....lb.	1.10	1.20	1.10	1.20	1.10	1.20
Albumen, light flake, 225 lb bbls .....lb.	.50	.60	.50	.60	.45	.60
dark, bbls .....lb.	.12	.17	.12	.17	.12	.17
egg, edible .....lb.	.79	.81	.79	1.05	.85	1.05
vegetable, edible .....lb.	.65	.70	.65	.70	.65	.70
ALCOHOLS						
Alcohol, Amyl (from Pentane) tks, delv .....lb.	...	.143	...	.143	...	...
c-l, drs, delv .....lb.	...	.150	...	.150	...	...
lcl, drs, delv .....lb.	...	.157	...	.157	...	...
Amyl, secondary, tks, delv .....lb.	...	.108	...	.108	...	.108
Benzyl, bottles .....lb.	.65	1.10	.65	1.10	.65	1.10
Butyl, normal, tks, delv lb. *d*	...	.08½	.08½	.11	.11	.12
c-l, drs, delv .....lb. *d*	...	.09½	.09½	.12	.12	.13
Butyl, secondary, tks, delv .....lb. *d*	...	.07½	.07½	.096	...	.096
c-l, drs, delv .....lb. *d*	...	.08½	.08½	.106	...	.106
Capryl, drs, tech, wks ..lb.	...	.85	...	.85	...	.85
Cinnamic, bottles .....lb.	3.25	3.65	3.25	3.65	3.25	3.65
Denatured, No. 5, c-l, drs, wks .....gal. *e*	...	.40	.40	.44	.34	.49
Western schedule, c-l, wks .....gal. *e*	...	.48	.48	.52	.38	.52
Denatured, No. 1, tks, wks .....gal. *e*	...	.28	...	.28	.29½	.31
c-l, drs, wks .....gal. *e*	...	.34	...	.34	.34½	.36
Western schedule, tks, wks .....gal. *e*	...	.34	...	.34	.32½	.35
c-l, drs, wks .....gal. *e*	...	.39	...	.39	.37½	.40
Diacetone, tech, tks, delv .....lb. *f*	...	.16	...	.16	...	.16
c-l, drs, delv .....lb. *f*	...	.17	...	.17	...	.17

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case; * Dealers are given 20% off this price.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Alcohols (continued)						
Ethyl, 190 proof, molasses, tks	gal. *g*	...	4.07	4.07	4.08½	4.10
c-l, drs	gal. *g*	...	4.12	4.12	4.27	4.13½ 4.27
c-l, bbls	gal. *g*	...	4.13	4.13	4.28	4.15½ 4.28
absolute, drs	gal. *g*	4.54	6.08½	4.54	6.11½	4.55½ 6.11½
Furfuryl, tech, 500 lb, drs	lb.	...	.35	...	.35	... .35
Hexyl, secondary tks, delv	lb.	...	.11½	...	.11½	... .11½
c-l, drs, delv	lb.	...	.12½	...	.12½	... .12½
Normal, drs, wks	lb.	3.25	3.50	3.25	3.50	3.25 3.50
Isoamyl, prim, cans, wks	lb.	...	.32	...	.32	... ...
drs, lcl, delvd	lb.	...	.27	...	.27	... ...
Isobutyl, refd, lcl, drs	lb.	...	.12	...	.12	.12 .60
c-l, drs	lb.	...	.11½	...	.11½	... ...
tks	lb.	...	.10½	...	.10½	... ...
Isopropyl, refd, c-l, drs	lb.	...	.55	...	.55	... .55
Prepyl, norm, 50 gal drs	gal.	...	.75	...	.75	... .75
Special Solvent, tks, wks	gal.	...	.27	.27	.32	... ...
Western points, tks, wks	gal.	...	.35	...	.35	... ...
Aldehyde ammonia, 100 gal drs	lb.	.80	.82	.80	.82	.80 .82
Alphanaphthol, crude, 300 lb bbls	lb.	.60	.65	.60	.65	.60 .65
Alphanaphthylamine, 350 lb bbls	lb.	.32	.34	.32	.34	.32 .34
Alum, ammonia, lump, c-l, bbls, wks	100 lb.	...	3.00	...	3.00	... 3.00
25 bbls or more, wks	100 lb.	...	3.15	...	3.15	... 3.15
less than 25 bbls, wks	100 lb.	...	3.25	...	3.25	... 3.25
Granular, c-l, bbls, wks	100 lb.	...	2.75	...	2.75	... 2.75
25 bbls or more, wks	100 lb.	...	2.90	...	2.90	... 2.90
Powd, c-l, bbls, wks	100 lb.	...	3.15	...	3.15	... 3.15
25 bbls or more, wks	100 lb.	...	3.30	...	3.30	... 3.30
Chrome, bbls	100 lb.	7.00	7.25	7.00	7.25	7.00 7.25
Potash, lump, c-l, bbls, wks	100 lb.	...	3.25	...	3.25	... 3.25
25 bbls or more, wks	100 lb.	...	3.40	...	3.40	... 3.40
Granular, c-l, bbls, wks	100 lb.	...	3.40	...	3.40	... 3.00
25 bbls or more, bbls, wks	100 lb.	...	3.00	...	3.00	... 3.15
Powd, c-l, bbls, wks	100 lb.	...	3.40	...	3.40	... 3.40
25 bbls or more, wks	100 lb.	...	3.55	...	3.55	... **3.55**
Soda, bbls, wks	100 lb.	4.00	4.15	4.00	4.15	4.00 4.15
Aluminum metal, c-l, NY	100 lb.	19.00	20.00	19.00	20.00	19.00 **23.30**
Acetate, CP, 20%, bbls	lb.	.09	.10	.09	.10	.09 .10
Chloride anhyd, 99%, wks	lb.	.07	.12	.07	.12	.07 .12
93%, wks	lb.	.05	.08	.05	.08	.05 .08
Crystals, c-l, drs, wks	lb.	.06½	.07	.06½	.07	.06½ .07
Solution, drs, wks	lb.	.03	.03½	.03	.03½	.03 .03½
Hydrate, 96%, light, 90 lb, bbls, delv	lb.	.13	.15	.13	.15	.13 .15
heavy, bbls, wks	lb.	.04	.04½	.04	.04½	.04 **.04½**
Oleate, drs	lb.	...	.15¾	...	.15¾	... **.15¾**
Palmitate, bbls	lb.	.21	.22	.21	.22	.20 .22
Resinate, pp., bbls	lb.	...	.15	...	.15	... .15
Stearate, 100 lb bbls	lb.	.18	.20	.18	.20	.17 .20
Sulfate, com, c-l, bgs, wks	100 lb.	...	1.35	...	1.35	... 1.35
c-l, bbls, wks	100 lb.	...	1.55	...	1.55	... 1.55
Sulfate, iron-free, c-l, bgs, wks	100 lb.	...	1.90	...	1.90	... 1.90
c-l, bbls, wks	100 lb.	...	2.05	...	2.05	... 2.05
Aminoazobenzene, 110 lb kgs	lb.	...	1.15	...	1.15	... 1.15
Ammonia anhyd com, tks	lb.	.04½	.05½	.04½	.05½	.04½ .05½
Ammonia anhyd, 100 lb cyl	lb.	.15¼	.21½	.15¼	.21½	.15¼ .21½
26°, 800 lb drs, delv	lb.	.02½	.03	.02½	.03	.02½ .03
Aqua 26°, tks, NH	cont.	...	.05	...	.05	... .05
tk wagon	lb.	...	.024	...	.024	... .024
Ammonium Acetate, kgs	lb.	.26	.33	.26	.33	.26 .33
Bicarbonate, bbls, f.o.b. plant	100 lb.	5.15	5.71	5.15	5.71	5.15 5.71
Bifluoride, 300 lb bbls	lb.	.15	.17	.15	.17	.15 .17
carbonate, tech, 500 lb bbls	lb.	.08	.12	.08	.12	.08 .12
Chloride, White, 100 lb bbls, wks	100 lb.	4.45	4.90	4.45	4.90	4.45 4.90
Gray, 250 lb bbls, wks	lb.	5.00	5.75	5.00	5.75	5.00 5.75
Lump, 500 lbs cks spot	lb.	.10½	.11	.10½	.11	.10½ .11
Lactate, 500 lb bbls	lb.	.15	.16	.15	.16	.15 .16
Linoleate	lb.	.11	.12	.11	.12	.11 .12
Nitrate, tech, cks	lb.	.04	.05	.04	.05	.04 .05
Oleate, drs	lb.	...	.10	...	.10	... **.10**
Oxalate, neut, cryst, powd, bbls	lb.	.26	.27	.26	.27	.26 .27
pure, cryst, bbls, kgs	lb.	.27	.28	.27	.28	.27 .28
Perchlorate, kgs	lb.	...	.16	...	.16	... .16
Persulfate, 112 lb kgs	lb.	.22½	.25	.22½	.25	.22½ .25
Phosphate, dibasic tech, powd, 325 lb bbls	lb.	.07½	.10	.07½	.10	.08 .10
Sulfate, dom, f.o.b., bulk	ton	24.00	26.00	22.00	26.00	20.00 24.00
200 lb bgs	ton	...	nom.	...	nom.	25.50 25.80
100 lb bgs	lb.	...	nom.	...	nom.	26.00 26.50
Sulfocyanide, kgs	lb.	...	.55	...	.55	... .50
Amyl Acetate (from pentane) tks, delv	lb.	...	.13½	...	.13½	... .13½
tech, drs, delv	lb.	.142	.149	.142	.149	.142 .149
secondary, tks, delv	lb.	...	.108	...	.108	... .108
c-l, drs, delv	lb.	.118	.123	.118	.123	.118 .123
Amyl Chloride, norm drs, wks	lb.	.56	.68	.56	.68	.56 .68
Chloride, mixed, drs, wks	lb.	.07	.077	.07	.077	**.07** **.077**
tks, wks	lb.	..	.06	...	.06	... .06
Mercaptan, drs, wks	lb.	..	1.10	...	1.10	... 1.10

g Grain alcohol 20c a gal. higher in each case.

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Amylene, drs, wks	lb.	.102	.11	.102	.11	.102 .11
tks, wks	lb.	...	.09	...	.09	... .09
Aniline Oil, 960 lb drs and tks	lb.	.15	.17½	.15	.17½	**.15** .17½
Annatto fine	lb.	.34	.37	.34	.37	.34 .37
Anthracene, 80%	lb.	...	.75	...	.75	... .75
40%	lb.	...	.18	...	.18	... .18
Anthraquinone, sublimed, 125 lb bbls	lb.	.50	.52	.50	.52	.50 .52
Antimony metal slabs, ton lots	lb.	...	.12⅝	.12½	.13½	.12½ .16
Needle, powd, bbls	lb.	.11½	.12	.11	.12½	.09 .13½
Butter of, see Chloride.						
Chloride, soln cbys	lb.	.13	.17	.13	.17	**.13** .17
Oxide, 500 lb bbls	lb.	.13¼	.13½	.13¼	.14	.10¼ .15
Salt, 63% to 65%, tins	lb.	.22	.24	.22	.24	**.22** .24
Sulfuret, golden, bbls	lb.	.22	.23	.22	.23	.19 .23
Vermilion, bbls	lb.	.35	.42	.35	.42	.35 .42
Archil, conc, 600 lb bbls	lb.	**.21**	.27	.21	.27	.21 .27
Double, 600 lb bbls	lb.	.18	.20	.18	.20	.18 .20
Triple, 600 lb bbls	lb.	.18	.20	.18	.20	.18 .20
Argols, 80%, casks	lb.	**.14**	.15	.14	.15	**.15** .16
Crude, 30%, casks	lb.	.07	.08	.07	.08	.07 .08
Aroclors, wks	lb.	.18	.30	.18	.30	.18 .30
Arrowroot, bbl	lb.	.08¾	.09¼	.08¾	.09¼	.08¾ .09¼
Arsenic, Red, 224 lb cs kgs	lb.	..	.15¾	...	.15¾	... .15¾
White, 112 lb kgs	lb.	.03½	.04½	.03½	.04½	.03½ .04½
Metal	lb.	.40	.42	.40	.42	.40 .42
Asbestine, c-l, wks	ton	13.00	15.00	13.00	15.00	13.00 15.00
Barium Carbonate precip, 200 lb bgs, wks	ton	56.50	61.00	56.50	61.00	56.50 61.00
Nat (witherite) 90% gr, c-l, wks, bgs	ton	42.00	45.00	42.00	45.00	42.00 45.00
Chlorate, 112 lb kgs NY	lb.	.15½	.17½	.15½	.17½	.14 .17½
Chloride, 600 lb bbl, wks	ton	72.00	74.00	72.00	74.00	72.00 74.00
Dioxide, 88%, 690 lb drs	lb.	.11	.12	.11	.12	.11 .12
Hydrate, 500 lb bbls	lb.	.05½	.06	.05½	.06	.05½ .06
Nitrate, 700 lb cks	lb.	...	.08¼	...	.08¼	... .08¼
Barytes, floated, 350 lb bbls wks	ton	23.65	31.15	23.65	31.15	23.00 31.15
Bauxite, bulk, mines	ton	7.00	10.00	7.00	10.00	7.00 10.00
Bentonite, c-l, No. 1, bgs, wks	ton	...	16.50	...	16.50	16.50 18.00
No. 2	ton	...	11.00	...	11.00	11.00 12.50
Benzaldehyde, tech, 945 lb drs, wks	lb.	.60	.62	.60	.62	.60 .62
Benzene (Benzol), 90%, Ind, 8000 gal tks, frt allowed	gal.	...	.18	...	.18	**.15** .18
90% c-l, drs	gal.	...	.23	...	.23	**.23** .24
Ind Pure, tks, frt allowed	gal.	...	.18	...	.18	.15 .18
Benzidine Base, dry, 250 lb bbls	lb.	.72	.74	.72	.74	.67 .69
Benzoyl Chloride, 500 lb drs	lb.	.40	.45	.40	.45	.40 .45
Benzyl Chloride, tech, drs	lb.	.30	.40	.30	.40	.30 .40
Beta-Naphthol, 250 lb bbl, wks	lb.	.24	.27	.24	.27	... .24
Naphthylamine, sublimed, 200 lb bbls	lb.	1.25	1.35	1.25	1.35	1.25 1.35
Tech, 200 lb bbls	lb.	.53	.55	.53	.55	.53 .55
Bismuth metal		1.00	1.10	1.00	1.10	.90 1.20
Chloride, boxes	lb.	3.20	3.25	3.20	3.25	3.20 3.25
Hydroxide, boxes	lb.	3.15	3.20	3.15	3.20	3.15 3.20
Oxychloride, boxes	lb.	2.95	3.00	2.95	3.00	**2.95** 3.00
Subbenzoate, boxes	lb.	3.25	3.30	3.25	3.30	**3.25** 3.30
Subcarbonate, kgs	lb.	1.40	1.45	1.40	1.45	**1.55** 1.70
Trioxide, powd, boxes	lb.	3.45	3.50	3.45	3.50	**3.45** 3.50
Subnitrate		1.30	1.35	1.30	1.35	**1.30** 1.45
Blackstrap, cane (see Molasses, Blackstrap).						
Blanc Fixe, 400 lb bbls, wks	ton *h*	42.50	70.00	42.50	70.00	42.50 70.00
Bleaching Powder, 800 lb drs, c-l, wks, contract	100 lb.	...	2.00	...	2.00	1.90 2.00
lcl, drs, wks	lb.	2.25	3.60	2.25	3.60	2.15 3.60
Blood, dried, f.o.b., NY	unit	...	3.00	3.00	3.20	2.50 3.25
Chicago, high grade	unit	...	3.25	3.25	3.50	2.50 3.75
Imported shipt	unit	...	2.70	2.70	3.05	2.75 3.30
Blues, Bronze Chinese Milori						
Prussian Soluble	lb.	.37	.38½	.37	.38½	.36½ .38
Ultramarine,* dry, wks, bbls	lb.	...	.10	...	.10	... ...
Regular grade, group 1	lb.	...	.15	...	.15	... ...
Special, group 1	lb.	...	.18	...	.18	... ...
Pulp, No. 1	lb.	...	.26	...	.26	... ...
Bone, 4½ + 50% raw, Chicago	ton	20.00	22.00	20.00	22.00	19.00 22.00
Bone Ash, 100 lb kgs	lb.	.06	.07	.06	.07	.06 .07
Black, 200 lb bbls	lb.	.05½	.08¼	.05½	.08¼	.05½ .08¼
Meal, 3% & 50%, imp.	ton	...	23.00	23.00	23.25	**22.75** 24.00
Domestic, bgs, Chicago	ton	17.00	19.00	17.00	20.00	16.00 21.00
Borax, tech, gran, 80 ton lots, sacks, delv	ton *i*	...	40.00	...	40.00	36.00 40.00
bbls, delv	ton *i*	...	50.00	...	50.00	46.00 50.00
c-l, sacks, delv	ton *i*	...	44.00	...	44.00	40.00 44.00
c-l, bbls, delv	ton *i*	...	54.00	...	54.00	50.00 54.00
Tech, powd, 80 ton lots, sacks	ton *i*	...	45.00	...	45.00	41.00 45.00
bbls, delv	ton *i*	...	56.00	...	56.00	51.00 56.00
c-l, sacks, delv	ton *i*	...	49.00	...	49.00	45.00 49.00
c-l, bbls, delv	ton *i*	...	59.00	...	59.00	55.00 59.00
Bordeaux Mixture, jobbers, East, c-l, tins, drs, cases	lb.	.08	.16	.08	.16	.08 .16
Jobbers, West, c-l	lb.	.08	.10	.08	.10	.08 .10
Dealers, East, c-l	lb.	.08½	.16½	.08½	.16½	.08½ .16½
Dealers, West, c-l	lb.	.09	.11	.09	.11	.09 .11

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; * Freight is equalized in each case with nearest producing point.

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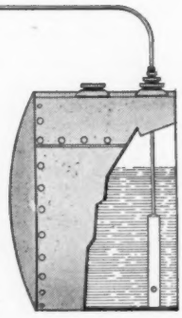

Bromine
Chromium Fluoride

Prices

	Current Market		1936 Low	1936 High	1935 Low	1935 High
Bromine, cases .....lb.	.30	.43	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.80	1.50	.80	1.50	.80	1.50
Gold, blk .....lb.	.40	.55	.40	.55	.40	.55
Butanes, com 16-32° group 3 tks .....lb.	...	.04	...	.04	...	.04
Butyl, Acetate, norm drs, frt allowed .....lb.	.09½	.10	.09½	.12½	.12	.13½
tks, frt allowed .....lb.	...	.08½	.08½	.11	.11	.13
Secondary, tks, frt allowed .....lb.	...	.07½	.07½	.096	...	.096
drs, frt, allowed .....lb.	.08½	.09	.106	.111	.106	.111
Aldehyde, 50 gal drs, wks .....lb.	.19	.21	.19	.21	.19	.21
Carbinol, norm drs, wks lb.	.60	.75	.60	.75	.60	.75
Lactate, drs .....lb.	.22½	.23½	.22½	.23½	.22½	.23½
Propionate, drs .....lb.	.18	.18½	.18	.18½	.18	.18½
tks, delv .....lb.	...	.17	...	.17	...	.17
Stearate, 50 gal drs ....lb.	...	.26	...	.26	...	.26
Tartrate, drs .....lb.	.55	.60	.55	.60	.55	.60
Cadmium, Sulfide, boxes...lb.	1.00	1.10	1.00	1.10	.75	.85
Cadmium Metal .....lb.	...	1.05	.85	1.05	.55	.90
Calcium, Acetate, 150 lb bgs c-l, delv .....100 lb.	...	2.10	...	2.10	2.00	2.10
Arsenate, jobbers, East of Rocky Mts, drs .....lb.	.06	.06⅜	.06	.06⅜	.06	.06½
dealers, drs .....lb.	.06¼	.07¾	.06¼	.07¾	.06¼	.07¾
South, jobbers, drs .....lb.	.06	.06½	.06	.06½	.06	.06½
dealers, drs .....lb.	.06½	.06¾	.06½	.06¾	.06¼	.06¾
Carbide, drs .....lb.	.05	.06	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l .....lb.	1.00	1.00	1.00	1.00	1.00	1.00
Chloride, flake, 375 lb drs, c-l, wks .....ton	...	19.50	...	19.50	...	19.50
Solid, 650 lb drs, c-l, f.o.b. wks .....ton	...	17.50	...	17.50	...	17.50
Ferrocyanide, 350 lb bbls wks .....lb.	...	.17	...	.17	...	.17
Gluconate, tech, 125 lb bbls .....lb.	...	.28	...	.28	...	.28
Nitrate, 100 lb bgs ....ton	...	26.50	...	26.50	...	26.50
Palmitate, bbls .....lb.	.21	.22	.21	.22	.20	.22
Peroxide, 100 lb drs ....lb.	...	1.25	...	1.25	...	1.25
Phosphate, tech, 450 lb bbls .....lb.	.07½	.08	.07½	.08	.07½	.08
Resinate, precip, bbls ...lb.	.13	.14	.13	.14	.13	.14
Stearate, 100 lb bbls ...lb.	.18	.20	.18	.20	.17	.20
Camphor, slabs .....lb.	.55	.56	.55	.56	.49	.57
Powder .....lb.	.55	.56	.55	.56	.50	.57
Camwood, Bk, ground bbls lb.	.16	.18	.16	.18	.16	.18
Carbon, Decolorizing, drs c-l .....lb.	.08	.15	.08	.15	.08	.15
Black, c-l, bgs, delv, price varying with zone ....lb.	.0445	.0535	.0445	.0535	.0445	.0535
lcl, bgs, delv, all zones lb.	...	.07	...	.07	...	.07
cartons, delv .....lb.	...	.07¾	...	.07¾	...	.07¾
cases, delv .....lb.	...	.08¼	...	.08¼	...	.08¼
Bisulfide, 500 lb drs ... lb.	.05¼	.08	.05¼	.08	.05¼	.08
Dioxide, Liq 20-25 lb cyl lb.	.06	.08	.06	.08	.06	.08
Tetrachloride, 1400 lb drs, delv .....lb.	.05¼	.06	.05¼	.06	.05¼	.06
Casein, Standard, Dom, grd lb.	.14½	.15	.14½	.16¾	.09½	.16¾
80-100 mesh, c-l, bgs....lb.	.15	.17	.15	.17¼	.10	.17¼
Castor Pomace, 5½ NH_3, c-l, bgs, wks .....ton	...	15.00	15.00	15.50	16.00	18.50
Imported, ship, bgs ....ton	...	18.00	17.50	18.00	17.25	20.00
Celluloid, Scraps, ivory cs lb.	.17	.18	.17	.18	.17	.18
Transparent, cs .....lb.	...	.20	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs .....lb.	.55	.60	.55	.60	.55	.60
Chalk, dropped, 175 lb bbls lb.	.03	.03¾	.03	.03¾	.03	.03¾
Precip, heavy, 560 lb cks lb.	.03	.04	.03	.04	.03	.04
Light, 250 lb cks .....lb.	.03	.04	.03	.04	.03	.04
Charcoal, Hardwood, lump, blk, wks .....bu.	...	.15	...	.15	...	.15
Willow, powd, 100 lb bbl, wks .....lb.	.06	.06¼	.06	.06¼	.06	.06¼
bgs, delv* .....ton	24.40	25.40	24.40	25.40	22.40	30.00
Chestnut, clarified bbls, wks lb.	...	.01⅞	...	.01⅞	...	.01⅞
25%, tks, wks .....lb.	...	.01½	...	.01½	...	.01½
Pwd, 60%, 100 lb bgs. wks .....lb.	...	.04⅞	...	.04⅞	...	.04⅞
China Clay, c-l, blk mines ton	...	7.00	...	7.00	...	7.90
Powdered, bbls .....lb.	.01	.02	.01	.02	.01	.02
Pulverized, bbls, wks ..ton	10.00	12.00	10.00	12.00	10.00	12.00
Imported, lump, blk ...ton	15.00	25.00	15.00	25.00	15.00	25.00
Chlorine, cyls, lcl, wks, contract .....lb.	.07½	.08½	.07½	.08½	.07½	.08½
cyls, c-l, contract ...lb. *j*	...	.05½	...	.05½	...	.05½
Liq, tk, wks, contract 100 lb.	...	2.15	...	2.15	2.00	2.15
Multi, c-l, cyls, wks, cont .....lb.	2.30	2.55	2.30	2.55	2.30	2.40
Chloroacetophenone, tins, wks .....lb.	...	2.00	...	2.00	...	2.00
Chlorobenzene, Mono, 100 lb drs, lcl, wks .....lb.	.06	.07½	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs .....lb.	.20	.21	.20	.21	.20	.21
USP, 25 lb tins .....lb.	.30	.31	.30	.31	.30	.31
Chloropicrin; comml cyls..lb.	.85	.90	.85	.90	.85	.90
Chrome, Green, CP .....lb.	.17	.18½	.17	.18½	.17	.30
Yellow .....lb.	.11	.12	.11	.12	.11	.16
Chromium, Acetate, 8% Chrome, bbls .....lb.	.06	.08	.06	.08	.05	.05¼
20° soln, 400 lb bbls .. lb.	...	.05½	...	.05½	...	.05½
Fluoride, powd, 400 lb bbl .....lb.	.27	.28	.27	.28	.27	.28

j A delivered price; * Depends upon point of delivery.

Current — Coal Tar Diphenylguanidine

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Coal tar, bbls ..... bbl.	7.25 9.00	7.25	9.00	7.25	9.00
Cobalt Acetate, bbls ..... lb.	... .58	.58	.60	...	.60
Carbonate tech, bbls .... lb.	1.35 1.40	1.35	1.40	1.35	1.40
Hydrate, bbls ..... lb.	1.66 1.76	1.66	1.76	1.66	1.76
Linoleate, paste, bbls ... lb.	... .30	...	.30	...	.30
Resinate, fused, bbls ... lb.	... .12½	...	.12½	...	.12½
Precipitated, bbls ..... lb.	... .32	...	.32	...	.32
Cobalt Oxide, black, bgs .. lb.	1.41 1.51	1.29	1.49	1.25	1.49
Cochineal, gray or bk bgs.. lb.	.32 .36	.32	.36	.32	.39
Teneriffe silver, bgs .... lb.	.33 .37	.33	.37	.33	.40
Copper, metal, electrol 100 lb.	... 9.50	...	9.50	8.00	9.25
Carbonate, 400 lb bbls .. lb.	... .08¼	...	.08¼	...	.08¼
52-54% bbls ..... lb.	.14½ .16¼	.14½	.16¼	.14½	.16¼
Chloride, 250 lb bbls .. lb.	.17 .18	.17	.18	.17	.18
Cyanide, 100 lb drs .... lb.	.37 .38	.37	.38	.37	.38
Oleate, precip, bbls .... lb.	... .20	...	.20	...	.20
Oxide, red, 100 lb bbls.. lb.	.14 .15	.14	.15	.15	.17
black bbls, wks ..... lb.	.14½ .15	.14½	.15	.14	.16½
Resinate, precip, bbls ... lb.	.18 .19	.18	.19	.18	.19
Stearate, precip, bbls .. lb.	.35 .40	.35	.40	.35	.40
Sub-acetate verdigris, 400 lb bbls ..... lb.	.18 .19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.	... 4.00	3.85	4.00	...	3.85
Copperas, crys and sugar bulk c-l, wks, bgs ..... ton	13.00 14.00	13.00	14.00	12.00	14.00
Corn Syrup, 42 deg, bbls ..... 100 lb.	... 3.25	3.05	3.25	3.18	3.63
43 deg, bbls ..... 100 lb.	... 3.30	3.10	3.30	3.23	3.68
Corn Sugar, tanners, bbls ..... 100 lb.	... 3.28	3.08	3.28	3.46	3.66
Cotton, Soluble, wet, 100 lb bbls ..... lb.	.40 .42	.40	.42	.40	.42
Cream Tartar, USP, powd & gran, 300 lb bbls .... lb.	... .16¾	...	.16¾	.16¼	.17¼
Creosote, USP, 42 lb cbys lb.	.45 .47	.45	.47	.45	.47
Oil, Grade 1, tks ..... gal.	.12½ .13½	.12½	.13½	.11½	.13½
Grade 2 ..... gal.	.109 .12	.109	.12	.10½	.12
Cresol, USP, drs ..... lb.	.10 .10½	.10	.10½	.10	.11½
Crotonaldehyde, 98%, 50 gal drs ..... lb.	.26 .30	.26	.30	.32	.36
Cudbear, English .. .. lb.	.19 .25	.19	.25	.19	.25
Cutch, Philippine, 100 lb bale ..... lb.	.04 .04¾	.04	.04¾	.03½	.04¾
Cyanamid. bgs, c-l, frt allowed Ammonia unit	... 1.07½	...	1.07½	...	1.07½
Dextrin, corn, 140 lb bgs f.o.b., Chicago ...100 lb.	3.65 3.85	3.45	3.85	3.60	4.15
British Gum, bgs ...100 lb.	3.90 4.20	3.70	4.20	3.85	4.50
White, 140 lb bgs ..100 lb.	3.60 3.80	3.40	3.80	3.50	4.10
Potato, Yellow, 220 lb bgs lb.	.07¾ .08¾	.07¾	.08¾	.07¾	.08¾
White, 220 lb bgs, lcl ...lb.	.08 .09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl ....lb.	... .08	...	.08	.08	.08¾
Diamylamine, drs, wks ...lb.	... 1.00	...	1.00	...	1.00
Diamylene, drs, wks .....lb.	.095 .102	.095	.102	.095	.102
tks, wks .....lb.	... .08½	...	.08½	...	.08½
Diamylether, wks, drs ....lb.	.085 .092	.085	.092	.085	.092
tks, wks ..... lb.	... .075	...	.075	...	.075
Diamylphthalate, drs wks gal.	.18 .19½	.18	.19½	.18	.20½
Diamyl Sulfide, drs, wks ..lb.	... 1.10	...	1.10	...	1.10
Dianisidine, bbls .....lb.	2.25 2.45	2.25	2.45	2.25	2.45
Dibutylphthalate, drs, wks lb.	.20 .21	.20	.21	.20	.23
Dibutyltartrate, 50 gal drs lb.	.35 .40	.35	.40	.35	.40
Dichlorethylene, drs .....gal.	.29 ...	.29	...	.29	...
Dichloroethylether, 50 gal drs, wks .....lb.	.16 .17	.16	.17	.16	.17
tks, wks .....lb.	... .15	...	.15	...	.15
Dichloromethane, drs, wks lb.	... .23	...	.23	.15	.23
Dichloropentanes, drs, wks lb.	.032 .040	.032	.040	.032	.040
tks, wks .....lb.	... .02½	...	.02½	...	.02½
Diethanolamine, tks .....lb.	... .30	...	.30	...	...
Diethylamine, 400 lb drs ..lb.	2.75 3.00	2.75	3.00	2.75	3.00
Diethyl Carbinol, drs .....lb.	.60 .75	.60	.75	.60	.75
Diethylcarbonate, com drs lb.	.31⅜ .35	.31⅜	.35	.31⅜	.35
90% grade, drs .....lb.	... .25	...	.25	...	.25
Diethylaniline, 850 lb drs..lb.	.52 .55	.52	.55	.52	.55
Diethylorthotoluidin, drs ..lb.	.64 .67	.64	.67	.64	.67
Diethyl phthalate, 1000 lb drs .....lb.	.18½ .19	.18½	.19	.18½	.27
Diethylsulfate, tech, 50 gal drs .....lb.	... ...	...	...	...	...
Diethyleneglycol, drs .....lb.	.15½ .17½	.15½	.17½	.15½	.17½
Mono ethyl ethers, drs..lb.	.15 .17	.15	.17	.15	.17
tks, wks .....lb.	... .15	...	.15	...	.15
Mono butyl ether, drs ..lb.	... .26	...	.26	...	.26
Diethylene oxide, 50 gal drs, wks .....lb.	.20 .24	.20	.24	.20	.27
Diglycol Oleate, bbls .... lb.	... .24	...	.24	.16	.24
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis .....lb.	... .95	...	.95	...	.95
Dimethylaniline, 340 lb drs lb.	.29 .30	.29	.30	.29	.30
Dimethyl Ethyl Carbinol, drs .....lb.	.60 .75	.60	.75	.60	.75
Dimethyl phthalate, drs ...lb.	.20 .21½	.20	.21½	.20½	.24½
Dimethysulfate, 100 lb drs lb.	.45 .50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls .....lb. *k*	.17 .19½	.17	.19½	.17	.19½
Dinitrochlorobenzene, 400 lb bbls ..... lb.	.14 .15½	.14	.15½	.14	.15½
Dinitronaphthalene, 350 lb bbls .....lb.	.34 .37	.34	.37	.34	.37
Dinitrophenol, 350 lb bbls lb.	.23 .24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls lb.	.15½ .16½	.15½	.16½	.15½	.16½
Diphenyl .....lb.	.15 .25	.[illegible]	.25	.15	.25
Diphenylamine .....lb.	.31 .32	.[illegible]	32	.31	.32
Diphenylguanidine, 100 lb bbl .....lb.	.35 .37	.35	.37	.36	.37

k Higher price is for purified material.

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VOLUMETRIC SOLUTIONS

Can be prepared - - - in a FEW MINUTES by the

FIXANAL* METHOD

1/10N	1/1N	5/1N	10/1N
As_2O_3	HCl	HCl	HCl
HCl	HNO_3	H_2SO_4	H_2SO_4
$C_2O_4H_2.2H_2O$	H_2SO_4	KOH	KOH
H_2SO_4	KOH	NaOH	NaOH
$(NH_4)CNS$	NaOH		
I			
$K_2Cr_2O_7$			
$KBrO_3$			
KOH			
$KMnO_4$			
$AgNO_3$			
Na_2HAsO_3			
$NaBrO_3$			
Na_2CO_3			
NaCl			
NaOH			
$C_2O_4Na_2$			
$Na_2S_2O_3+5H_2O$			

Which do you need?

Also

Special Normalities for testing:—
Sugar
Oil & Fat
Blood & Urine
Milk
Iron & Steel
Benzol

Ringers Soln.
Physiol. Salt Soln. etc.

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Dip Oil
Glycerin — Prices

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Dip Oil, see Tar Acid Oil.					
Divi Divi pods, bgs shipmt ton	42.00	45.00	34.00	45.00	36.00	40.00
Extract .....lb.	.05	.05½	.05	.05½	.05	.05½
Egg Yolk, dom., 200 lb cases .....lb.	...	.68	.63	.68	.46	.63
Imported .....lb.	.49	.51	.49	.56	...	...
Epsom Salt, tech, 300 lb bbls c-l NY .....100 lb.	1.80	2.00	1.80	2.00	1.80	2.25
USP, c-l, bbls .....100 lb.	...	2.00	...	2.00	2.00	2.25
Ether, USP anaesthesia 55 lb drs .....lb.	.22	.23	.22	.23	.22	.23
(Conc) .....lb.	.09	.10	.09	.10	.09	.10
Ether, Isopropyl 50 gal drs lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed .....lb.	...	.06	...	.06	...	.06
Nitrous, conc, bottles ...lb.	.75	.77	.75	.77	.75	.77
Synthetic, wks, drs ....lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt alld .....lb.	...	.06	.06	.08	.07½	.08
drs, frt alld .....lb.	.07	.07½	.07½	.09	.08½	.09
Anhydrous, tks, frt alld..lb.	...	.07	.07	.08½	...	.08½
drs, frt alld .....lb.	.08	.08½	.08	.10	.09½	.10
Acetoacetate, 50 gal drs lb.	.65	.68	.65	.68	.65	.68
Benzylaniline, 300 lb drs lb.	.88	.90	.88	.90	.88	.90
Bromide, tech, drs ....lb.	.50	.55	.50	.55	.50	.55
Chloride, 200 lb drs ....lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate cbys ...lb.	...	.30	...	.30	...	.30
Crotonate, drs .....lb.	1.00	1.25	1.00	1.25	1.00	1.25
Ether, Absolute, 50 gal drs .....lb.	.50	.52	.50	.52	.50	.52
Lactate, drs, wks .....lb.	.25	.29	.25	.29	.25	.29
Methyl Ketone, 50 gal drs, frt allowed .....lb.	.08½	.09	.08½	.09	.08½	.09
tks, frt allowed .....lb.	...	.07½	...	.07½	...	.07½
Oxalate, drs, wks .....lb.	.37½	.55	.37½	.55	.37½	.55
Oxybutyrate, 50 gal drs, wks .....lb.	.30	.30½	.30	.30½	.30	.30½
Ethylene Dibromide, 60 lb drs .....lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont .....lb.	.75	.85	.75	.85	.75	.85
Anhydrous .....lb.	...	.75	...	.75	...	...
Dichloride, 50 gal drs ..lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks lb.	.17	.21	.17	.21	.17	.28
tks, wks .....lb.	...	.16	...	.16	...	...
Mono Butyl Ether, drs, wks .....lb.	.20	.21	.20	.21	.20	.21
tks, wks .....lb.	...	.19	...	.19	...	.19
Mono Ethyl Ether, drs, wks .....lb.	.16	.17	.16	.17	.16	.17
tks, wks .....lb.	...	.15	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks .....lb.	.17½	.18½	.17½	.18½	.17½	.18½
tks, wks .....lb.	...	.16½	...	.16½	...	.16½
Mono, Methyl Ether, drs wks .....lb.	.19	.23	.19	.23	.19	.23
tks, wks .....lb.	...	.18	...	.18	...	...
Stearate	.18	.18	.18	.18	.18	.18
Oxide, cyl .....lb.	.55	.60	.55	.60	.55	.75
Ethylidenaniline .....lb.	.45	.47½	.45	.47½	.45	.47½
Feldspar, blk pottery ....ton	..	14.50	..	14.50	...	14.50
Powd, blk, wks .....ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls .....lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys .....lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground, wks .....unit *l*	...	2.50	...	2.50	2.25	2.90
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis .....unit *m*	...	2.25	...	2.25	2.00	2.35
Fluorspar, 98%, bgs .....lb.	30.00	35.50	30.00	35.50	28.00	35.50
Formaldehyde, USP, 400 lb bbls, wks .....lb.	.06	.07	.06	.07	.06	.07
Fossil Flour .....lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines .....ton	6.50	15.00	6.50	15.00	6.50	15.00
Imp powd, c-l, bgs ....ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks..lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb drs .....lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.16	.18	.16	.18	.16	.18
Fustic, chips .....lb.	.04	.05	.04	.05	.04	.05
Crystals, 100 lb boxes...lb.	.20	.23	.20	.23	.20	.23
Liquid 50°, 600 lb bbls..lb.	.08½	.12	.08½	.12	.08½	.12
Solid, 50 lb boxes.....lb.	.16	.18	.16	.18	.16	.18
Sticks .....ton	25.00	26.00	25.00	26.00	25.00	26.00
G Salt paste, 360 lb bbls...lb.	.45	.47	.45	.47	.42	.43
Gall Extract .....lb.	.18	.20	.18	.20	.18	.20
Gambier, com 200 lb bgs..lb.	...	.06	...	.06	.05	.08
Singapore cubes, 150 lb bgs .....100 lb.	.08	.09	.08	.09	.07½	.09½
Gelatin, tech, 100 lb cs .. lb.	.50	.55	.50	.55	.50	.55
Glauber's Salt, tech, c-l, wks .....100 lb.	1.10	1.30	1.10	1.30	1.10	1.30
Anhydrous, see Sodium Sulfate.						
Glucose (grape sugar) dry 70-80° bgs, c-l, NY ..100 lb.	3.24	3.34	3.24	3.34	3.24	3.34
Tanner's Special, 100 lb bgs .....100 lb.	...	2.33	...	2.33	...	2.33
Glue, bone, com grades, c-l bgs .....lb.	.10½	.17½	.10½	.17½	...	...
Better grades, c-l, bgs lb.	.12	.17½	.12	.17½	...	...
Casein, kgs .....lb.	.18	.22	.18	.22	.18	.22
Glycerin, CP, 550 lb drs ..lb.	.14½	.17	.16	.17	.14	.14½
Dynamite, 100 lb drs ...lb.	.14½	.14¼	.13¾	.14½	.13¾	.14¼
Saponification, drs .....lb.	.11¼	.11½	.10¼	.11½	.10	.11½
Soap Lye, drs .. ..lb.	.10¼	.09½	.09¼	.10¼	.09	.10

l + 10; *m* + 50.

Current

Glyceryl Phthalate
Gum, Yacca

		Current Market		1936 Low	1936 High	1935 Low	1935 High
Glyceryl Phthalate	lb.	...	.28	...	.28	...	.28
Glyceryl Stearate, bbls	lb.	...	.18	...	.18	...	.18
Glycol Phthalate	lb.	...	.35	.29	.35	.28	.29
Glycol Stearate	lb.	...	.23	...	.23	.18	.23
Graphite:							
Crystalline, 500 lb bbls	lb.	.04	.05	.04	.05	.04	.05
Flake, 500 lb. bbls	lb.	.08	.16	.08	.16	.08	.16
Amorphous, bbls	lb.	.03	.04	.03	.04	.03	.04
GUMS							
Gum Aloes, Barbadoes	lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts	lb.	.09½	.10	.09½	.10¾	.09½	.15
White sorts, No. 1, bgs	lb.	.25	.27	.25	.27	.21	.27
No. 2, bgs	lb.	.24	.26	.24	.26	.19	.26
Powd, bbls	lb.	.13	.14	.13	.14	.13¼	.18
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY	lb.	.02½	.10½	.02½	.10½	.02½	.10½
Egyptian, 200 lb cases, f.o.b., NY	lb.	.12	.15	.12	.15	.12	.15
California, f.o.b., NY, drs	ton	29.00	55.00	29.00	55.00	29.00	55.00
Benzoin Sumatra, USP, 120 lb cases	lb.	.18	.19	.18	.19	.19	.28
Copal, Congo, 112 lb bgs, clean, opaque	lb.	.18½	.19	.18½	.20	.19½	.24⅝
Dark amber	lb.	.07¼	.08	.07½	.08	.07¼	.09¼
Light amber	lb.	.13⅝	.14⅛	.13⅝	.14⅛	.11½	.14⅞
Copal, East India, 180 lb bgs							
Macassar pale bold	lb.	.12⅝	.13¼	.12⅝	.14	.09½	.10¾
Chips	lb.	.06⅛	.06½	.06⅛	.06½	.05½	.06
Nubs	lb.	...	.10⅞	...	.10⅞	...	...
Dust	lb.	.03⅝	.04⅛	.03⅝	.04⅛	.03⅝	.04½
Singapore							
Bold	lb.	.15¾	.16¼	.16⅜	.16⅞	.12⅛	.17
Chips	lb.	.04¾	.05¼	.04¾	.05¼	.04⅝	.05⅝
Nubs	lb.	.10⅜	.11¼	.10⅜	.11¼	.10	.11¾
Dust	lb.	.03⅝	.04⅛	.03⅝	.04⅛	.03⅝	.05⅛
Copal Manilla, 180-190 lb baskets, Loba A	lb.	.12	.12½	.12	.13	.11¾	.13
Loba B	lb.	.10¾	.11½	.10¾	.12	.10¼	.12
Loba C	lb.	.09⅞	.10⅜	.09⅞	.11⅛	.10⅛	.11½
MA sorts	lb.	.06⅞	.07⅜	.06⅞	.07⅝	.06	.07⅜
DBB	lb.	.08	.08⅞	.08	.08⅞	.08	.09
Dust	lb.	.05⅝	.06⅛	.05⅝	.06⅛	.04⅞	.06⅛
Copal Pontianak, 224 lb cases, bold genuine	lb.	.14¼	.14¾	.14¼	.16	.14⅜	.16⅝
Mixed	lb.	.13¼	.13¾	.13¼	.13¾	.12⅞	.14⅞
Chips	lb.	.07⅜	.07⅞	.07	.07⅞	.06⅞	.08¼
Nubs	lb.	.10¼	.10½	.10¼	.10½	.09⅜	.11¾
Split	lb.	.12⅞	.13	.12⅞	.13	.12⅜	.13⅞
Dammar Batavia, 136 lb cases							
A	lb.	.21¾	.22¼	.21⅜	.22¼	.19	.21⅞
B	lb.	.20¾	.21½	.20⅜	.21½	.18	.20⅞
C	lb.	...	.16⅝	.16½	.17⅝	.16	.17
D	lb.	.14¼	.14⅜	.13⅝	.14⅜	.11¾	.14⅛
A/D	lb.	.15¾	.17	.15½	.17	.14	.16
A/E	lb.	.13⅛	.13⅝	.13⅛	.14¼	.11¾	.13¾
E	lb.	.06¾	.07¼	.06¾	.07¼	.07	.07¼
F	lb.	.06⅜	.06⅞	.06⅜	.06⅞	.06⅛	.06⅞
Singapore							
No. 1	lb.	.16¼	.16⅞	.16¼	.17½	.15⅝	.19
No. 2	lb.	.13¾	.14¼	.13¾	.14¼	.10⅝	.14⅞
No. 3	lb.	.05¼	.05¾	.05¼	.05¾	.04⅝	.05⅞
Chips	lb.	...	.09¾	.09¾	.09¾	.08⅞	.09¼
Dust	lb.	...	.05½	.05⅛	.05⅝	.04¾	.05⅞
Seeds	lb.	...	.07⅜	.06⅝	.07⅜	.04¾	.07¼
Ester	lb.	.07⅝	.08⅜	.07⅝	.08⅜	.07¼	.08⅜
Elemi, cons	lb.	.09¾	.10¼	.09¾	.10¼	...	...
Gamboge, pipe, cases	lb.	.58	.59	.58	.59	.55	.65
Powd, bbls	lb.	.65	.66	.65	.66	.65	.75
Ghatti, sol. bgs	lb.	.11	.15	.11	.15	.09	.15
Karaya, powd, bbls, xxx	lb.	.24	.25	.24	.25	.23	.25
xx	lb.	.16	.17	.16	.17	.15	.17
No. 1	lb.	.09½	.10	.09½	.10	.08	.10
No. 2	lb.	.08½	.09	.08½	.09	.07	.09
Kauri, NY, San Francisco, Brown XXX, cases	lb.	.60	.60½	.60	.60½	.60	.60½
BX	lb.	.33	.33½	.33	.33½	.33	.33½
B1	lb.	.19	.19½	.19	.19½	.19	.19½
B2	lb.	.14½	.15	.14½	.15	.14½	.15
B3	lb.	.12	.12½	.12	.12½	.12	.12½
Pale XXX	lb.	.65	.65½	.65	.65½	.65	.65½
No. 1	lb.	.40	.40½	.40	.40½	.40	.40½
No. 2	lb.	.22	.22½	.22	.22½	.22	.22½
No. 3	lb.	.15	.15½	.15	.15½	.15	.15½
Kino, tins	lb.	.70	.80	.70	.80	.70	.80
Mastic	lb.	.60	.60½	.60	.60½	.46	.60½
Sandarac, prime quality, 200 lb bgs & 300 lb cks	lb.	.26¼	.26½	.26¼	.26½	.26¼	.35½
Senegal, picked bgs	lb.	.20	.21	.20	.21	.20	.21
Sorts	lb.	.11½	.12½	.11½	.12½	.09⅜	.12½
Thus, bbls	280 lbs.	...	11.00	...	11.00	10.50	11.00
Strained	280 lbs.	...	11.00	...	11.00	10.50	11.00
Tragacanth, No. 1, cases	lb.	1.25	1.30	1.20	1.30	1.15	1.30
No. 2	lb.	1.15	1.20	1.10	1.20	1.05	1.20
No. 3	lb.	1.00	1.05	.95	1.05	.95	1.05
No. 4	lb.	.90	.95	.85	.95	.85	.95
No. 5	lb.	.80	.85	.75	.85	.75	.85
No. 6, bgs	lb.	.21	.25	.18	.25	.14	.19
Sorts, bgs	lb.	.30	.35	.25	.30	.11	.25
Yacca, bgs	lb.	.03¼	.03¾	.03¼	.03¾	.03¼	.03¾

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C-1

Helium
Meta-nitro-paratoluidine

Prices

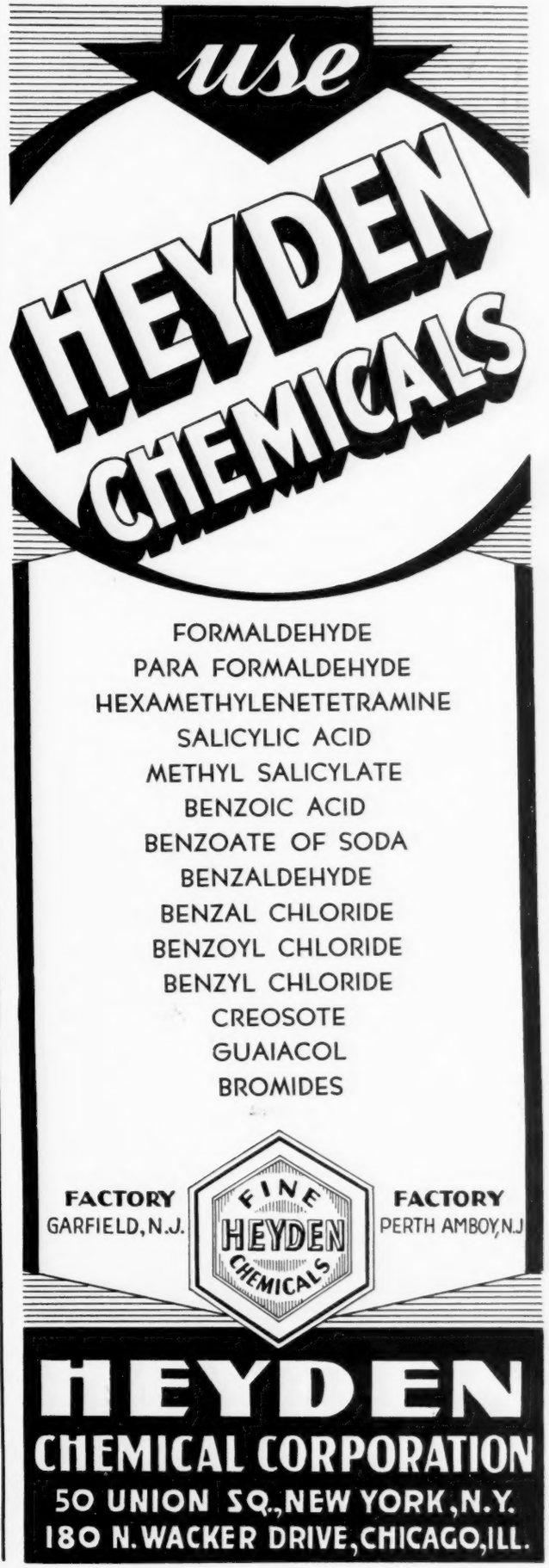
		Current Market	1936 Low	1936 High	1935 Low	1935 High
Helium, cyl (200 cu. ft.)	cyl.	...	25.00	... 25.00	...	25.00
Hematite crystals, 400 lb bbls	lb.	.16	.18	.16 .18	.16	.18
Paste, 500 bbls	lb.	...	.11	... .11	...	.11
Hemlock, 25%, 600 lb bbls, wks	lb.	...	.02⅞	... .02⅞	...	.02⅞
tks	lb.	...	.02½	... .02½	...	.02½
Hexalene, 50 gal drs, wks	lb.	...	.30	... .30	...	.30
Hexane, normal 60-70°C. Group 3, tks	gal.	...	.12	... .12	...	.14
Hexamethylenetetramine, drs	lb.	.37	.39	.37 .39	.37	.39
Hexyl Acetate, delv, drs	lb.	.12	.12½	.12 .12½	.12	.12½
tks	lb.	...	.11½	... .11½	...	.11½
Hoof Meal, f.o.b. Chicago unit		...	2.50	... 2.50	2.50	2.70
Hydrogen Peroxide, 100 vol, 140 lb cbys	lb.	.20	.21	.20 .21	.20	.21
Hydroxyamine Hydrochloride	lb.	...	3.15	... 3.15	...	3.15
Hypernic, 51°, 600 lb bbls	lb.	.17	.20	.17 .20	.17	.20
Indigo, Madras, bbls	lb.	1.25	1.30	1.25 1.30	1.25	1.30
20% paste, drs	lb.	.15	.18	.15 .18	.15	.18
Synthetic, liquid	lb.	.13	.14	.13 .14	...	.12
Iodine, Resublimed, kgs	lb.	1.50	1.55	1.50 1.75	...	1.90
Irish Moss, ord, bales	lb.	.09	.10	.09 .10	.09	.10
Bleached, prime, bales	lb.	.18	.19	.18 .19	.18	.19
Iron Acetate Liq. 17°, bbls	lb.	.03	.04	.03 .04	.03	.04
Chloride see Ferric Chloride.						
Nitrate, coml, bbls	100 lb.	2.75	3.25	2.75 3.25	2.75	3.25
Oxide, English	lb.	.07½	08¾	.07½ .08¾	.07½	.08¾
Isobutyl Carbinol (128-132°C) drs, wks	lb.	.33	.34	.33 .34	.33	.34
tks, wks	lb.	...	.32	... .32	...	.32
Isopropyl Acetate, tks, frt allowed	lb.	...	.06	.06 .07½	...	.07½
drs, frt allowed	lb.	.07	.07½	.07 .09	.08½	.09
Ether, see Ether, isopropyl.						
Keiselguhr, 95 lb bgs, NY, Brown	ton	60.00	70.00	60.00 70.00	60.00	70.00
Lead Acetate, brown, broken, f.o.b. NY, bbls	lb.	...	.09½	... .09½	...	.09½
White, broken, bbls	lb.	...	.11	... .11	...	.11
cryst, bbls	lb.	...	.10½	... .10½	...	.10½
gran, bbls	lb.	...	.11	... .11	...	.11
powd, bbls	lb.	...	.11¼	... .11¼	...	.11¼
Arsenate, East, jobbers, drs	lb.	.09	.09⅜	.09 .09⅜	.09	.09½
Dealers, drs	lb.	.09¼	.10¾	.09¼ .10¾	.09¼	.10¾
West, jobbers, drs	lb.	...	.09	... .09	...	.09
dealers, drs	lb.	...	.10	... .10	...	.10
Linoleate, solid, bbls	lb.	.26	.26½	.26 .26½	.26	.26½
Metal, c-l, NY	100 lb.	...	4.60	4.50 4.60	3.50	4.50
Red, dry, 95% Pb_3O_4, delv	lb.	.0735	...	.07 .08	.06	.08
97% Pb_3O_4, delv	lb.	.0760	...	.07¼ .08¼	.06¼	.08¼
98% Pb_3O_4, delv	lb.	...	.0810	.07½ .08½	.06½	.08½
Nitrate, 500 lb bbls, wks	lb.	.09	.09½	.09 .09½	.10	.14
Oleate, bbls	lb.	.15	.16	.15 .16	.15	.16
Resinate, precip, bbls	lb.	...	.14	... .14	...	.14
Stearate, bbls	lb.	.22	.23	.22 .23	.22	.23
White, 500 lb bbls, wks	lb.	.06½	.07	.06½ .07	.06½	.07
Sulfate, 500 lb bbls, wks	lb.	...	.06	... .06	...	.06
Lime, chemical quicklime, f.o.b., wks, bulk	ton	7.00	7.25	7.00 7.25	7.00	7.25
Hydrated, f.o.b., wks	ton	9.00	12.00	8.50 12.00	8.50	12.00
Lime Salts, see Calcium Salts.						
Lime sulfur, dealers, tks	gal.	...	.11	... .11	.10½	.11
drs	gal.	.13	.16	.13 .16	.13	.16½
Dry, bgs, jobbers	lb.	.07¼	.10¼	.07¼ .10¼	...	...
Linseed Meal, bgs	ton	...	29.50	29.00 30.00	25.50	40.00
Litharge, coml, delv, bbls	lb.	.0610	.07	.06 .07	.05	.07
Lithopone, dom, ordinary, delv, bgs	lb.	.04½	.04¾	.04½ .04¾	.04½	.04¾
bbls	lb.	.04¾	.05	.04¾ .05	.04¾	.05
High strength, bgs	lb.	.06	.06¼	.06 .06¼	.06	.06¼
bbls	lb.	.06¼	.06½	.06¼ .06½	.06¼	.06½
Titanated, bgs	lb.	.06	.06¼	.06 .06¼	.06	.06¼
bbls	lb.	.06¼	.06½	.06¼ .06½	.06¼	.06½
Logwood, 51°, 600 lb bbls	lb.	.06½	.10¼	.06½ .10½	.08½	.10½
Solid, 50 lb boxes	lb.	.13½	.17½	.13½ .17½	.13½	.17½
Sticks	ton	24.00	26.00	24.00 26.00	24.00	26.00
Madder, Dutch	lb.	.22	.25	.22 .25	.22	.25
Magnesite, calc, 500 lb bbl	ton	60.00	65.00	60.00 65.00	60.00	65.00
Magnesium Carb, tech, 70 lb bgs, wks	lb.	.06	.06½	.06 .06½	.06	.06½
Chloride flake, 375 lb drs, c-l, wks	ton	36.00	39.00	36.00 39.00	36.00	39.00
Magnesium fluosilicate, crys, 400 lb bbls, wks	lb.	.10	.10½	.10 .10½	.10	.10½
Oxide, USP, light, 100 lb bbls	lb.	...	.42	... .42	...	.42
Heavy, 250 lb bbls	lb.	...	.50	... .50	...	.50
Palmitate, bbls	lb.	.23	.24	.23 .24	.22	.24
Stearate, bbls	lb.	.20	.22	.20 .22	.19	.22
Linoleate, lig drs	lb.	.18	.19	.18 .19	.18	.19
Resinate, fused, bbls	lb.	.08¼	.08½	.08¼ .08½	.08¼	.08½
precip, bbls	lb.	...	.12	... .12	...	.12
Manganese Borate, 30%, 200 lb bbls	lb.	.15	.16	.15 .16	.15	.16
Chloride, 600 lb cks	lb.	.09	.12	.09 .12	.09	.12
Dioxide, tech (peroxide), paper bgs, c-l	ton	...	47.50	... 47.50	45.00	50.00
Mangrove, 55%, 400 lb bbls	lb.	...	.04	... .04	...	.04
Bark, African	ton	27.00	27.50	26.00 27.00	26.00	30.00
Marble Flour, blk	ton	12.00	13.00	12.00 13.00	12.00	13.00
Mercuric chloride	lb.	.81	.83	.81 .83	.71	.93
Mercury metal	76 lb. flasks	77.00	78.00	77.00 80.00	69.00	77.00
Meta-nitro-aniline	lb.	.67	.69	.67 .69	.67	.69
Meta-nitro-paratoluidine 200 lb bbls	lb.	1.40	1.55	1.40 1.55	1.40	1.55

Current

Meta-phenylene-diamine — Orthodichlorobenzene

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Meta-phenylene-diamine 300 lb bbls	lb.	.80	.80	.84	.80	.84
Peroxide, 100 lb cs	lb.	1.20	1.20	1.25	1.20	1.25
Silicofluoride, bbls	lb.	.09	.09	.10	.09	.10
Stearate, bbls	lb.	.19	.19	.20	.19	.20
Meta-toluene-diamine, 300 lb bbls	lb.	.67	.67	.69	.67	.69
Methanol, 95%, frt allowed, drs	gal. *o*	.37½	.37½	.58	.37½	.58
tks, frt allowed	gal. *o*	.33	.33	.36½	.33	.36½
97% frt allowed, drs	gal. *o*	.38½	.38½	.59	.38½	.59
tks, frt allowed	gal. *o*	.34	.34	.37½	.34	.37½
Pure, frt allowed, drs	gal. *o*	.40	.40	.61	.40	.61
tks, frt allowed	gal. *o*	.35½	.35½	.39	.35½	.39
Synthetic, frt allowed, drs	gal. *o*	.40	.40	.61	.40	.61
tks, frt allowed	gal. *o*	.35½	.35½	.39	.35½	.39
Methyl Acetate, dom, 98-100%, drs	lb.	.16	.11	.18½	.18	.18½
Synthetic, 410 lb drs	lb.	.16	.16	.17	.16	.17
tks	lb.	...	...	.15	...	.15
Acetone, frt allowed, drs	gal. *p*	.48½	.48½	.68½	.49½	.73½
tks, frt allowed, drs	gal. *p*	.44	.44	.47½	.44	.52½
Synthetic, frt allowed, east of Rocky M., drs	gal. *p*	.57½	.57½	.60	.57½	.60
tks, frt allowed	gal.	...	...	.53	...	.53
West of Rocky M., frt allowed, drs	gal. *p*	.66	.66	.69	.66	.69
tks, frt allowed	gal. *p*	...	...	.63½	...	.63½
Hexyl Ketone, pure, drs	lb.	...	...	.60	...	.60
Anthraquinone	lb.	.65	.65	.67	.65	.67
Butyl Ketone, tks	lb.	...	...	.10½	...	.10½
Chloride, 90 lb cyl	lb.	...	...	.45	...	.45
Ethyl Ketone, tks	lb.	...	...	.07½	...	.07½
Propyl carbinol, drs	lb.	.60	.60	.75	.60	.75
Mica, dry grd, bgs, wks	lb.	35.00	35.00	...	35.00	...
Michler's Ketone, kgs	lb.	...	...	2.50	...	2.50
Molasses, blackstrap, tks, f.o.b. NY	gal.	.08	.08	.08¼	.07¾	.08¼
Monoamylamine, drs, wks	lb.	...	...	1.00	...	1.00
Monochlorobenzene, see Chlorobenzene, mono.						
Monoethanolamine, tks, wks	lb.	...	...	.30	...	...
Monomethylparaminosulfate, 100 lb drs	lb.	3.75	3.75	4.00	3.75	4.00
Myrobalans 25%, liq bbls	lb.	...	...	.04¼	...	.04¼
50% Solid, 50 lb boxes	lb.	.06	.06	.06¼	.06	.06¼
J1 bgs	ton	22.75	22.75	24.00	23.50	27.00
J2 bgs	ton	...	...	14.50	15.00	15.75
R2 bgs	ton	...	...	14.00	16.00	16.50
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks	gal.	...	...	.31	.26	.30
drs, c-l	gal.	...	...	.36	.31	.35
Naphthalene, dom, crude, bgs, wks	lb.	4.00	3.50	4.00	1.65	3.00
Imported, cif, bgs	lb.	...	...	...	1.90	3.00
Dyestuffs, bgs, bbls, Eastern wks	lb.	.06	.06	.07	.04¼	.07
Balls, flakes, pks	lb.	...	.07¼	.08	...	...
Balls, ref'd, bbls, Eastern wks	lb.	...	.07¼	.06¾	.07¼	.04½	.06¾
Flakes, ref'd, bbls, Eastern wks	lb.	...	.07¼	.06¾	.07¼	.04½	.06¾
Dyestuffs, bgs, bbls, Mid-West wks	lb. *q*	.06½	.07½	.06½	.07½	.04¾	.07½
Balls, ref'd, bbls, Mid-West wks	lb. *q*	...	.07¾	.07¼	.07¾	.05	.07½
Flakes, ref'd, bbls, Mid-West wks	lb. *q*	...	.07¾	.07¼	.07¾	.05	.07¼
Nickel Carbonate, bbls	lb.	...	.36	...	.36	.35	.36
Chloride, bbls	lb.	.18	.19	.18	.19	.18	.19
Oxide, 100 lb kgs, NY	lb	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.12½	.13½
Single, 400 lb bbls, NY	lb.	.13	.13½	.13	.13½	.11½	.13½
Metal ingot	lb.	...	.35	...	.35	...	.35
Nicotine, free 50%, 8 lb tins, cases	lb.	8.25	10.15	8.25	10.15	8.25	10.15
Sulfate, 55 lb drs	lb.	.75	1.17	.75	1.17	.67	.80
Nitre Cake, blk	ton	12.00	14.00	12.00	14.00	12.00	14.00
Nitrobenzene, redistilled, 1000 lb drs, wks	lb.	.09	.11	.09	.11	.09	.11
tks	lb.	...	.08½	...	.08½	...	.08½
Nitrocellulose, c-l-l c-l, wks	lb.	.29½	.34	.29½	.34	.27	.34
Nitrogenous Mat'l, bgs, imp	unit	2.20	2.25	2.20	2.25	2.20	2.75
dom, Eastern wks	unit	1.90	2.00	1.90	2.25	2.20	2.40
dom, Western wks	unit	...	1.90	...	1.90	1.90	2.30
Nitronaphthalene, 550 lb bbls	lb.	.24	.25	.24	.25	.24	.25
Nutgalls Aleppy, bgs	lb.	.16	.18	.16	.18	.12	.18
Chinese, bgs	lb.	.19	.20	.19	.20	.19	.20
Oak Bark Extract, 25%, bbls	lb.	...	.03½	...	.03½	...	.03½
tks	lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks	lb.	...	.15	...	.15	...	...
Orange-Mineral, 1100 lb cks NY	lb.	.10	.10½	.10	.10½	.09¼	.10½
Orthoaminophenol, 50 lb kgs	lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs	lb.	.82	.84	.82	.84	.82	.84
Orthochlorophenol, drs	lb.	.50	.65	.50	.65	.50	.65
Orthocresol, drs	lb.	.13	.15	.13	.15	.13	.15
Orthodichlorobenzene, 1000 lb drs	lb.	.06½	.11½	.05½	.11½	.05½	.06

o Country is divided in 5 zones, prices varying by zone. In drum prices range covers both zone and c-l and lcl quantities in the 5 zones; in each case, bbl. prices are 2½c higher; synthetic is not shipped in bbls.; *p* Country is divided into 5 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila. or N. Y.



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Rochester, N. Y.

Orthonitrochlorobenzene
Phloroglucinol

Prices

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Orthonitrochlorobenzene, 1200 lb drs, wks ....lb.	.28	.28	.29	.28	.29
Orthonitrotoluene, 1000 lb drs, wks ....lb.	.07	.07	.10	.05½	.10
Orthonitrophenol, 350 lb drs ....lb.	.52	.52	.80	.52	.80
Orthotoluidine, 350 lb bbls, l-c-l ....lb.	.14½	.14½	.15	.14½	.15
Orthonitroparachlorphenol, tins ....lb.	.70	.70	.75	.70	.75
Osage Orange, cryst ....lb.	.17	.17	.25	.17	.25
51 deg liquid ....lb.	.07	.07	.07¾	.07	.07¾
Powd, 100 lb bgs ....lb.	.14½	.14½	.15	.14½	.15
Paraffin, rfd, 200 lb cs slabs 122-127 deg M P ....lb.	.0445	.0445	.04½	.04	.04¾
128-132 deg M P ....lb.	.04¾	.04¾	.049	.05	.0515
133-137 deg M P ....lb.	.05½	.05½	.05¾	.0575	.06
Para aldehyde, 110-55 gal drs ....lb.	.16	.16	.18	.16	.18
Aminoacetanilid, 100 lb kgs ....lb.	...	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ....lb.	1.25	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	...	1.05	...	1.05
Chlorophenol, drs ....lb.	.50	.50	.65	.50	.65
Coumarone, 330 lb drs ..lb.	...	...	...	...	...
Cymene, refd, 110 gal dr ....gal.	2.25	2.25	2.50	2.25	2.50
Dichlorobenzene, 150 lb bbls wks ....lb.	.16	.16	.20	.16	.20
Formaldehyde, bbls, wks lb.	.38	.38	.39	.38	.39
Nitroacetanilid, 300 lb bbls ....lb.	.45	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks ....lb.	.47	.47	.51	.48	.55
Nitrochlorobenzene, 1200 lb drs, wks .... lb.	.23½	.23½	.24	.23½	.24
Nitro-orthotoluidine, 300 lb bbls ....lb.	2.75	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.45	.45	.50	.45	.50
Nitrosodimethylaniline, 120 lb bbls ....lb.	.92	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	.36	.36	.37	.35	.37
Phenylenedamine, 350 lb bbls ....lb.	1.25	1.25	1.30	1.25	1.30
Para Tertiary amyl phenol, wks, drs ....lb.	.32	.32	.50	.32	.50
Toluenesulfonamide, 175 lb bbls ....lb.	.70	.70	.75	.70	.75
tks, wks ....lb.	...	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks ....lb.	.20	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ....lb.	.58	.58	.60	.56	.60
Paris Green, Arsenic Basis 100 lb kgs ....lb.	...	...	.24	...	.24
250 lb kgs ....lb.	...	...	.22	...	.22
Perchlorethylene, 50 gal drs ....lb.	...	...	.15	...	.15
Persian Berry Ext, bbls ..lb.	.55	.55	Nom.	.55	Nom.
Pentane, normal, 28-38°C, group 3, tks....gal.	...	...	.09	...	.09
drs, group 3 ....gal.	.10	.10	.15	.10	.15
Petrolatum, dark amber, bbls ....lb.	.02⅝	.02⅞	.02⅝	.02⅞	.02	.02⅞
Light, bbls ....lb.	.03⅛	.03⅜	.03⅛	.03⅜	.02½	.03⅜
Medium, bbls ....lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02¼	.03⅛
Dark green, bbls ....lb.	.02½	.02¾	.02½	.02¾	.02½	.02¾
White, lily, bbls ....lb.	.06	.06¼	.06	.06¼	.05¼	.06½
White, snow, bbls ....lb.	.07	.07¼	.07	.07¼	.06¼	.07½
Red, bbls ....lb.	.02⅝	.02⅛	.02⅝	.02⅛	.02¼	.02⅞
Petroleum Ether, 30-60°, group 3, tks ....gal.	...	.13	...	.13	...	.13
drs, group 3 ....gal.	.15	.16	.15	.16	.15	.16

PETROLEUM SOLVENTS AND DILUENTS

Cleaners naphthas, group 3, tks, wks ....gal.	.07⅜	.07½	.07⅜	.07½	.06⅞	.07¼
Bayonne, tks, wks ..gal.	...	.09½	.09	.09½	...	.09
West Coast, tks ....gal.	...	.15	...	.15	...	.15
Hydrogenated, naphthas, frt allowed East, tks ....gal.	...	.16	...	.16	.15	.17½
No. 2, tks ....gal.	...	.18	...	.18	.18	.22½
No. 3, tks ....gal.	..	.15	...	.15	.15	.17½
No. 4, tks ....gal.	...	.18	...	.18	.18	.22½
Lacquer diluents, tks Bayonne ....gal.	.12	.12½	.12	.12½	.12	.12½
Group 3, tks ....gal.	.08⅜	.08½	.08⅜	.08½	.07⅞	.08
Naphtha, V.M.P., East, tks, wks ....gal.	...	.09½	.09	.09½	...	.09
Group 3, tks, wks ...gal.	.07⅜	.07½	.07⅜	.07½	.06⅞	.07¼
Petroleum thinner, East, tks, wks ....gal.	...	.09	.09	.09½	...	.09
Group 3, tks, wks ..gal.	.06⅜	.06⅝	.06⅜	.06⅝	.05⅞	.06¼
Rubber Solvents, stand grd, East, tks, wks ....gal.	...	.09½	.09	.09½	...	.09
Group 3, tks, wks ..gal.	.07⅜	.07½	.07⅜	.07½	.06⅞	.07¼
Stoddard Solvent, East, tks, wks .... gal.	...	.09½	.09	.09½	...	.09
Group 3, tks, wks ...gal.	.06⅞	.07	.06⅞	.07	.06⅜	.07
Phenol, 250-100 lb drs ....lb.	.14¼	.15	.14¼	.15	.14¼	.15
Phenyl-Alpha-Naphthylamine, 100 lb kgs ....lb.	...	1.35	...	1.35	...	1.35
Phenyl Chloride, drs ....lb.	...	.16	...	.16	...	.16
Phenylhydrazine Hydrochloride ....lb.	2.90	3.00	2.90	3.00	2.90	3.00
Phloroglucinol, tech, tins ..lb.	15.00	16.50	15.00	16.50	15.00	16.50
CP, tins ....lb.	20.00	22.00	20.00	22.00	20.00	22.00

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Phosphate Rock, f.o.b. mines						
Florida Pebble, 68% basis	ton	...	1.85	...	1.85	1.85	3.40
70% basis	ton	...	2.35	...	2.35	2.35	3.90
72% basis	ton	...	2.85	...	2.85	2.85	4.40
75-74% basis	ton	...	3.85	...	3.85	3.85	5.40
75% basis	ton	...	4.35	...	4.35	4.35	5.50
Tennessee, 72% basis	ton	...	4.50	...	4.50	4.50	4.75
Phosphorous Oxychloride 175 lb cyl	lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases	lb.	.44	.45	.44	.45	.44	.45
Yellow, 110 lb cs, wks	lb.	.28	.33	.28	.33	.28	.33
Sesquisulfide, 100 lb cs	lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl	lb.	.16	.20	.16	.20	.16	.20
Phthalic Anhydride, 100 lb drs, wks	lb.	.14½	.15½	.14½	.15½	.14½	.15½
Pine Oil, 55 gal drs or bbls							
Destructive dist	lb.	.44	.46	.44	.46	.44	.50
Steam dist wat wh bbls	gal.	.64	.65	.64	.65	.64	.65
tks	gal.	...	.59	...	.59	...	.59
Straw color, bbls	gal.	...	.59	...	.59	...	.59
tks	gal.	...	.54	...	.54	...	.54
Pitch Hardwood, wks	ton	...	15.00	...	15.00	15.00	20.00
Burgundy, dom, bbls, wks	lb.	...	.03½	...	.03½	...	.03½
Imported	lb.	.11	.13	.11	.13	.11	.13
Coaltar, bbls, wks	ton	...	19.00	...	19.00	...	19.00
Petroleum, see Asphaltum in Gums' Section.							
Pine, bbls	bbl.	4.00	4.50	4.00	4.50	3.75	4.25
Stearin, drs	lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, refd	oz.	34.50	38.00	34.50	38.00	35.00	38.00

POTASH

Potash, Caustic, wks, sol	lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake	lb.	.07	.07⅛	.07	.07⅛	.07	.07⅛
Liquid, tks	lb.	...	.02⅞	...	.02⅞	...	.02⅞
Potash Salts, Rough Kainit 14% basis	ton	...	8.50	...	8.50	...	8.50
Manure Salts, imported							
20% basis, blk	ton	...	11.00	...	11.00	8.60	11.00
30% basis, blk	ton	...	14.40	...	14.40	12.90	14.40
Domestic, cif ports, blk unit		...	.43	...	.43	...	.43
Potassium Acetate	lb.	.26	.28	.26	.28	.26	.28
Potassium Muriate, 80% basis bgs	ton	...	22.50	...	22.50	22.00	22.50
Dom, blk	unit	...	.45	...	.45	.40	.45
Pot & Mag Sulfate, 48% basis bgs	ton	22.25	22.50	22.25	22.50	19.50	22.50
Potassium Sulfate, 90% basis bgs	ton	...	33.75	...	33.75	33.75	35.00
Potassium Bicarbonate, USP 320 lb bbls	lb.	.09	.18	.09	.18	.07½	.09
Bichromate Crystals, 725 lb cks	lb.	.08½	.09	.08½	.09	.08⅛	.09
Binoxalate, 300 lb bbls	lb.	...	.23	...	.23	.22	.23
Bisulfate, 100 lb kgs	lb.	.15½	.18	.15½	.18	.35	.36
Carbonate, 80-85% calc 800 lb cks	lb.	.07¼	.07½	.07¼	.07½	.07½	.07⅞
liquid, tks	lb.	...	.02⅞	...	.02⅞	...	...
drs, wks	lb.	.03⅛	.03¼	.03⅛	.03¼	...	...
Chlorate crys, 112 lb kgs, wks	lb.	.09¼	.09½	.09¼	.09½	...	.09¾
gran, kgs	lb.	.12	.13	.12	.13	.12	.13
powd, kgs	lb.	.08	.08¼	.08	.08¼	.08¾	.09¾
Chloride, crys, bbls	lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs	lb.	.23	.28	.23	.28	.23	.28
Cyanide, 110 lb cases	lb.	.55	.57½	.55	.57½	.55	.57½
Iodide, 75 lb bbls	lb.	1.10	1.15	1.10	1.25	1.25	1.40
Metabisulfite, 300 lb bbls	lb.	...	.15	...	.15	...	.15
Oxalate, bbls	lb.	.25	.26	.25	.26	.16	.24
Perchlorate, cks, wks	lb.	.09	.11	.09	.11	.09	.11
Permanganate, USP, crys, 500 & 1000 lb drs, wks	lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, 112 lb kgs	lb.	.35	.38½	.35	.38½	.35	.38½
Yellow, 500 lb casks	lb.	.18	.19	.18	.19	.18	.19
Tartrate Neut, 100 lb kgs	lb.	...	.21	...	.21	...	.21
Titanium Oxalate, 200 lb bbls	lb.	.32	.35	.32	.35	.32	.35
Propane, group 3, tks	lb.	...	.03	...	.03	...	.07
Pumice Stone, lump bgs	lb.	.04½	.06	.04½	.06	.04½	.06
250 lb bbls	lb.	.05	.07	.05	.07	.05	.07
Powd, 350 lb bgs	lb.	.02½	.03	.02½	.03	.02½	.03
Putty, coml, tubs	100 lb.	...	2.75	...	2.75	...	2.75
Linseed Oil, kgs	100 lb.	...	4.50	...	4.50	...	4.50
Pyridine, 50 gal drs	gal.	...	1.30	...	1.30	1.20	1.30
Pyrites, Spanish cif Atlantic ports, blk	unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins	lb.	2.40	2.75	2.40	2.75	2.40	3.00
Quebracho, 35% liq tks	lb.	...	.02⅝	...	.02⅝	...	.02⅝
450 lb bbls, c-l	lb.	...	.03½	.03⅛	.03½	...	.03⅛
Solid, 63%, 100 lb bales cif	lb.	...	.03⅝	...	.03⅝	...	.03⅝
Clarified, 64%, bales	lb.	...	.03⅞	...	.03⅞	...	.03⅞
Quercitron, 51 deg liq, 450 lb bbls	lb.	.06	.06½	.06	.06½	.06	.06½
Solid, 100 lb boxes	lb.	.10	.12	.10	.12	.10	.12
R Salt, 250 lb bbls, wks	lb.	.52	.57	.52	.57	.44	.45
Resorcinol tech, cans	lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst	lb.	.14	.14½	.14	.14½	.14	.15
Powd, bbls	lb.	.13	.13½	.13	.13½	.13	.13½
Rosin Oil, bbls, first run	gal.	.42	.44	.41	.44	.36	.45
Second run	gal.	.48	.50	.47	.50	.43	.48
Third run, drs	gal.	.55	.57	.54	.57	.50	.60

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Prices

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:						
B	...	4.50	4.45	4.65	4.65	5.65
D	...	5.05	4.95	5.15	5.02½	5.75
E	...	5.15	5.15	5.30	5.15	5.90
F	...	5.50	5.40	5.60	5.20	5.95
G	...	5.55	5.50	5.75	5.25	6.00
H	...	5.55	5.55	5.85	5.25	6.00
I	...	5.55	5.60	5.85	5.25	6.00
K	...	5.60	5.70	6.00	5.27½	6.05
M	...	5.60	5.60	5.95	5.35	6.10
N	...	5.70	5.70	6.02½	5.75	6.40
WG	...	5.85	5.85	6.35	5.95	6.87½
WW	...	5.90	5.90	6.90	6.25	7.55
Rosins, Gum, Savannah (280 lb unit):						
B	...	3.25	3.15	3.40	3.40	4.40
D	...	3.80	3.75	3.90	3.70	4.50
E	...	3.90	3.90	4.05	3.90	4.65
F	...	4.25	4.10	4.36	3.95	4.70
G	...	4.30	4.20	4.45	4.00	4.75
H	...	4.30	4.30	4.60	4.00	4.75
I	...	4.30	4.30	4.60	4.00	4.75
K	...	4.35	4.35	4.65	4.02½	4.80
M	...	4.35	4.35	4.70	4.10	4.85
N	...	4.45	4.45	4.80	4.50	5.15
WG	...	4.45	4.45	5.10	4.70	5.60
WW	...	4.60	4.60	5.65	5.15	6.25
X	...	4.60	4.60	5.65	5.20	6.25
Rosins, Wood, wks (280 lb unit), wks, FF	...	4.20	4.20	4.25	4.05	6.35
I	...	4.45	4.45	4.70	4.30	7.00
M	...	4.55	4.55	5.10	4.55	7.25
N	...	4.95	4.95	5.75	5.00	7.75
Rosin, Wood. c-l, FF grade, NY	...	4.92	4.92	5.12	4.92	5.62
Rotten Stone, bgs mines..ton	..	35.00	...	35.00	23.50	35.00
Lump, imported, bbls ...lb.	.05	.07	.05	.07	.05	.07
Selected, bbls. .....lb.	.08	.10	.08	.10	.08	.10
Powdered, bbls .....lb.	.02½	.05	.02½	.05	.02½	.05
Sago Flour, 150 lb bgs ....lb.	.02¾	.03¾	.02¾	.03¾	.02¾	.03¾
Sal Soda, bbls, wks ...100 lb.	..	1.15	1.15	1.30	...	1.30
Salt Cake, 94-96%, c-l, wks ton	19.00	23.00	19.00	23.00	13.00	18.00
Chrome, c-l, wks .....ton	11.00	12.00	11.00	13.00	12.00	13.00
Saltpetre, double refd, gran, 450-500 lb bbls .....lb.	.059	.06¼	.059	.06¼	.059	.06¼
Powd, bbls .....lb.	.069	.07⅞	.069	.07⅞	.069	.07⅞
Cryst, bbls .....lb.	.069	.08	.069	.08	.069	.08
Satin, White, 550 lb bbls..lb.	..	.01½	..	.01½	...	.01½
Shellac, Bone dry, bbls..lb. *r*	.19	.20	.19	.26½	.19	.32
Garnet, bgs .....lb.	.16	.17	.16	.20	.17	.27
Superfine, bgs .....lb. *s*	.15½	.17	.15½	.18	.16	.28
T. N., bgs .....lb. *s*	.14½	.15½	.14	.16	.13	.25
Schaeffer's Salt, kgs .....lb.	.48	.50	.48	.50	.48	.50
Silver Nitrate, vials .....oz.	....	.32⅞	.32⅞	.32⅝	.36⅜	.53¾
Slate Flour, bgs, wks ....ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.25	...	1.25	...	1.25
58% light, bgs .... 100 lb.	...	1.23	...	1.23	...	1.23
blk .....100 lb.	...	1.05	...	1.05	...	1.05
paper bgs .....100 lb.	...	1.20	...	1.20	...	1.20
bbls .....100 lb.	...	1.50	...	1.50	...	1.50
Soda Caustic, 76% grnd & flake, drs .....100 lb.	...	3.00	...	3.00	...	3.00
76% solid, drs .....100 lb.	...	2.60	...	2.60	...	2.60
Liquid sellers, tks, 100 lbs.	...	2.25	...	2.25	...	2.25
Sodium Abietate, drs .....lb.	...	.08	...	.08	...	.08
Acetate, tech, 450 lb bbls. wks .....lb.	.04½	.05	.04½	.05	.04½	.05
Alizmate, drs .....lb.	..	.64	..	.64	...	.64
Antimoniate, bbls .....lb.	.12¼	.12¾	.12¼	.14	...	...
Arsenate, drs .....lb.	...	.10½	...	.10½	...	.10½
Arsenite, liq. drs .....gal.	.40	.75	.40	.75	.40	.75
Benzoate, USP, kgs ....lb.	.46	.48	.46	.48	.46	.48
Bicarb, 400 lb bbl, wks 100 lb.	...	1.85	...	1.85	...	1.85
Bichromate, 500 lb cks, wks .....lb.	.06½	.07	.06½	.07	.06⅛	.07
Bisulfite, 500 lb bbl, wks lb	.03¼	.036	.03¼	.036	.03¼	.036
35-40% sol cbys, wks 100 lb.	1.95	2.10	1.95	2.10	1.95	2.10
Chlorate, bgs, wks .....lb.	.06¼	.07½	.06¼	.07½	.06¾	.07½
Chloride, tech .....ton	13.60	16.50	13.60	16.50	13.60	16.50
Cyanide, 96-98%, 100 & 250 lb drs, wks .....lb.	.15½	.17½	.15½	.17½	.15½	.17½
Fluoride, 90%, 300 lb bbls, wks .....lb.	.07½	.08¼	.07¼	.08¼	.07¼	.08¼
Hydrosulfite, 200 lb bbls. f.o.b. wks .....lb.	.18	.19	.18	.19	.18	.21
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	2.50	3.00	2.50	3.00	2.50	3.00
Tech, reg cryst, 375 lb bbls, wks .....100 lb.	2.40	2.75	2.40	2.75	2.40	2.75
Iodide .....lb.	1.90	1.95	1.90	2.05	2.00	2.40
Metanilate, 150 lb bbls..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks .....100 lb.	2.30	3.00	2.30	3.00	2.65	3.05
cryst, bbls, wks ..100 lb.	...	2.90	2.90	3.25	...	3.25
Monohydrate, bbls .....lb.	...	.023	...	.023	...	.02½
Napthenate, drs .....lb.	...	.09	...	.09	...	.09
Naphthionate, 300 lb bbl lb.	.52	.54	.52	.54	.52	.54
Nitrate, 92%, crude, 200 lb bgs, c-l, NY .....ton	...	25.80	24.80	25.80	...	24.80
100 lb bgs .....ton	...	26.50	25.50	26.50	...	25.50
Bulk .....ton	...	24.50	23.50	24.50	...	23.50

r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 3c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; *s* T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y.

	Current Market	1930 Low	1930 High	1935 Low	1935 High
Sodium (continued):					
Nitrite, 500 lb bbls ....lb.	.0710	.08	.0710	.08	.07¼	.08
Orthochlorotoluene, sulfonate, 175 lb bbls, wks..lb.	.25	.27	.25	.27	.25	.27
Perborate, 275 lb bbls ..lb.	.17	.18	.17	.18	.17	.19
Peroxide, bbls, 400 lb ..lb.	...	.17	...	.17	...	.17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.10	2.10	2.30	2.20	2.30
bgs, wks .....100 lb.	...	1.90	1.90	2.10	2.00	2.10
tri-sodium, tech, 325 lb bbls, delv .....100 lb.	...	2.20	2.20	2.30	2.30	2.70
bgs, delv .....100 lb.	...	2.00	2.00	2.10	2.10	2.60
Picramate, 160 lb kgs ..lb.	.67	.69	.67	.69	.67	.69
Prussiate, Yellow, 350 lb bbl, wks .....lb.	.11½	.12	.11½	.12	.11½	.12
Pyrophosphate, anhyd, 100 lb bbls .....lb.	.102	.132	.102	.132	.102	.15
Silicate, 60°, 55 gal drs, wks .....100 lb.	1.65	1.70	1.65	1.70	1.65	1.70
40°, 35 gal drs, wks 100 lb.	...	.80	...	.80	...	.80
tks, wks .....100 lb.	...	.65	...	.65	...	.65
Silicofluoride, 450 lb bbls NY .....lb.	.06	.06¼	.05¾	.06¼	.04¾	.05
Stannate, 100 lb drs ....lb.	.31½	.34	.31⅛	.34	.31	.38
Stearate, bbls .....lb.	.22	.26	.21	.26	.20	.25
Sulfanilate, 400 lb bbls..lb.	.16	.18	.16	.18	.16	.18
Sulfate Anhyd, 550 lb bbls c-l, wks .....100 lb. †	1.30	1.55	1.30	1.55	1.25	2.35
Sulfide, 80% cryst, 440 lb bbls, wks .....lb.	...	.02¼	...	.02¼	...	.02¼
62% solid, 650 lb drs, c-l, wks .....lb.	...	.03	...	.03	...	.03
Sulfite, cryst, 400 lb bbls, wks .....lb.	.023	.02½	.023	.02½	.023	.02½
Sulfocyanide, bbls ..... lb.	.28	.47	.28	.47	.32	.42½
Tungstate, tech, crys, kgs lb.	.85	.90	.85	.90	...	.90
Spruce Extract, ord, tks...lb.	...	.01	...	.01	...	.01
Ordinary, bbls .....lb.	...	.01½	...	.01½	...	.01½
Super spruce ext, tks....lb.	...	.01⅝	...	.01⅝	...	.01⅝
Super spruce ext, bbls.. lb.	...	.01⅞	...	.01⅞	...	.01⅞
Super spruce ext, powd, bgs .....lb.	...	.04	...	.04	...	.04
Starch, Pearl, 140 lb bgs .....100 lb.	3.19	3.39	2.99	3.39	3.13	3.78
Powd, 140 lb bgs....100 lb.	3.29	3.49	3.09	3.49	3.23	3.66
Potato, 200 lb bgs.....lb.	.04½	.05½	.04½	.05½	.04½	.06
Imp, bgs .....lb.	.05¾	.06	.05¾	.06	.05¾	.06½
Rice, 200 lb bbls .....lb.	...	.07¼	...	.07¼	.07¼	.08½
Wheat, thick, bgs .....lb.	...	.08¼	...	.08¼	...	.08¼
Strontium carbonate, 600 lb bbls, wks .....lb.	.07¼	.07½	.07¼	.07½	.07¼	.07½
Nitrate, 600 lb bbls, NY lb.	.08¾	.09½	.08¾	.09½	.08¾	.09½
Sucrose octa-acetate, den, grd, bbls, wks .....lb.	.45	...	.45	...	...	...
tech, bbls, wks .....lb.	.40	...	.40	...	...	...
Sulfur	...	...	...	...	...	...
Crude, f.o.b. mines ....ton	18.00	19.00	18.00	19.00	18.00	19.00
Flour, coml, bgs ....100 lb.	1.60	2.35	1.60	2.35	1.60	2.35
bbls .....100 lb.	1.95	2.70	1.95	2.70	1.95	2.70
Rubbermakers, bgs ..100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls .....100 lb.	2.55	3.15	2.55	3.15	2.55	3.15
Extra fine, bgs .....100 lb.	2.40	3.00	2.40	3.00	2.40	3.00
Superfine, bgs .....100 lb.	2.20	2.80	2.20	2.80	2.20	2.80
bbls .....100 lb.	2.25	3.10	2.25	3.10	2.25	3.10
Flowers, bgs .....100 lb.	3.00	3.75	3.00	3.75	3.00	3.75
bbls .....100 lb.	3.35	4.10	3.35	4.10	3.35	4.10
Roll, bgs .....100 lb.	2.35	3.10	2.35	3.10	2.35	3.10
bbls .....100 lb.	2.50	3.25	2.50	3.25	2.50	3.25
Sulfur Chloride, red, 700 lb drs, wks .....lb.	.05	.05½	.05	.05½	.05	.05½
Yellow, 700 lb drs, wks lb.	.03½	.04½	.03½	.04½	.03½	.04½
Sulfur Dioxide, 150 lb cyl lb.	.06½	.08½	.06½	.08¾	.08½	.10
Multiple units, wks ....lb.	.05½	.06	.05½	.06	...	.06½
tks, wks .....lb.	.04½	.04¾	.04½	.04¾	...	.04¾
Refrigeration, cyl, wks .. lb.	.10	.13	.10	.13	...	.13
Multiple units, wks .....lb.	.07	.09¼	.07	.09¼	...	.09¼
Sulfuryl Chloride .....lb.	.15	.40	.15	.40	.15	.40
Sumac, Italian, grd .....ton	52.00	...	52.00	54.00	50.00	65.00
dom, bgs, wks .....ton	...	35.00	...	35.00	...	35.00
Superphosphate, 16% bulk, wks .....ton	8.25	Nom.	8.25	Nom.	8.25	8.50
Run of pile .....ton	7.75	Nom.	7.75	Nom.	7.75	8.00
Talc, Crude, 100 lb bgs, NY .....ton	14.00	15.00	14.00	15.00	14.00	15.00
Refd, 100 lb bgs, NY ton	16.00	18.00	16.00	18.00	16.00	18.00
French, 220 lb bgs, NY ton	23.00	30.00	22.00	30.00	22.00	30.00
Refd, white, bgs .....ton	45.00	60.00	45.00	60.00	45.00	60.00
Italian, 220 lb bgs to arr ton	70.00	75.00	70.00	75.00	70.00	75.00
Refd, white, bgs, NY ton	75.00	80.00	75.00	80.00	75.00	80.00
Tankage Grd, NY ....unit ¤	...	2.85	2.85	3.10	2.35	3.00
Ungrd .....unit ¤	...	2.50	2.50	2.75	2.15	2.50
Fert grade, f.o.b. Chicago .....unit ¤	...	2.50	2.50	2.75	2.25	2.65
South American cif..unit ¤	...	2.70	2.70	3.15	2.45	3.15
Tapioca Flour, high grade, bgs .....lb.	.03½	.05½	.03½	.05½	.0215	.05
Tar Acid Oil, 15%, drs ..gal.	.22½	.23½	.22½	.23½	.21	.23½
25%, drs .....gal.	.24½	.26½	.24½	.26½	.23	.26½
Tar, pine, delv, drs .....gal.	...	.26	.25	.26	.25	.26
tks, delv .....gal.	...	.20	...	.20	...	.20
Tartar Emetic, tech .....lb.	.24¾	.25	.24¾	.25	.22¾	.25
USP, bbls .....lb.	.28	.28½	.28	.28½	.28	.28½
Terpineol, den grd, drs ...lb.	.13¾	.14¼	.13¾	.14¼	.13¾	.14¼
tks .....lb.	.13	.14	.13	.14	.13	.14
Tetrachlorethane, 50 gal drs lb.	.08	.08½	.08	.08½	.08½	.09
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12	.13
Thiocarbanilid, 170 lb bbl..lb.	.20	.25	.20	.25	.20	.25

† Bags 15c lower; ¤ + 10.

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Prices

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Tin, crystals, 500 lb bbls, wks ..... lb.	.36	.36½	.36	.37½	.36	.39½
Metal, NY ..... lb.	...	.47	.47	.48⅞	.456	.52½
Oxide, 300 lb bbls, wks lb.	.51	.53	.51	.53	.51	.58
Tetrachloride, 100 lb drs, wks ..... lb.	...	.23¾	.23¼	.24¼	.24¾	.26¾
Titanium Dioxide, 300 lb bbls ..... lb.	.17¼	.19¼	.17¼	.19¼	.17¼	.19¼
Barium Pigment, bbls .. lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Calcium Pigment, bbls .. lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Toluol, 110 gal drs, wks gal.	...	.35	...	.35	...	.35
8000 gal tks, frt allowed gal.	...	.30	...	.30	...	.30
Toluidine, mixed, 900 lb drs, wks ..... lb.	.27	.28	.27	.28	.27	.28
Toner Lithol, red, bbls .... lb.	.75	.80	.75	.80	.75	.80
Para, red, bbls ..... lb.	...	.75	...	.75	...	.75
Toluidine, bgs ..... lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks lb.	.32	.36	.32	.36	.32	.36
Triamylamine, drs, wks .. lb.	...	1.25	...	1.25	...	1.25
Trichlorethylene, 50 gal drs lb.	.089	.094	.089	.094	.09½	.10
Triethanolamine, 50 gal drs wks ..... lb.	.26	.30	.26	.30	.26	.38
tks, wks ..... lb.	...	.25	...	.25	...	...
Tricresyl Phosphate, drs .. lb.	.19	.26	.19	.26	.21	.23
Triphenyl Guanidine ..... lb.	.58	.60	.58	.60	.58	.60
Tripoli, airfloated, bgs, wks ..... ton	27.50	30.00	27.50	30.00	27.50	30.00
Tungsten, Wolframite per unit	15.00	15.25	15.00	15.25	15.00	15.25
Turpentine (Spirits), c-l, NY dock, bbls ..... gal.	...	.41¼	.41¼	.50	.43¾	.55½
Savannah, bbls ..... gal.	...	.36½	.36½	.45	.38¾	.50¼
Jacksonville, bbls .. .... gal.	...	.36	.36	.44½	.38¾	.50¼
Wood Steam dist, bbls, c-l, NY ..... gal.	...	.39	.39	.47	.43	.50
Urea, pure, 112 lb cases .. lb.	.14½	.15½	.14½	.17	.15½	.17
Fert grade, bgs, c.i.f. .. ton c.i.f. S.A. points .... ton	95.00	110.00	95.00	110.00	100.00	120.00
Urea, dom, f.o.b., wks.... ton	95.00	110.00	95.00	110.00	...	...
Urea Ammonia liq 55% NH_3, tks ..... unit	...	.96	...	.96	...	.96
Valonia beard, 42%, tannin bgs ..... ton	...	64.50	60.00	64.50	40.00	58.00
Cups, 32% tannin, bgs.. ton	...	Nom.	...	Nom.	26.00	49.00
Mixture, bark, bgs ..... ton	...	Nom.	...	Nom.	...	32.00
Vanilin, ex eugenol, 100 lb tins ..... lb.	...	3.75	...	3.75	...	...
Ex-guaiacol ..... lb.	...	3.65	...	3.65	...	...
Vermillion, English, kgs .. lb.	1.59	1.61	1.58	1.79	1.48	1.71
Vinyl Chloride, 16 lb cyl .. lb.	..	1.00	..	1.00	..	1.00
Wattle Bark, bgs ..... ton	27.00	29.00	27.00	29.75	29.00	32.00
Extract, 60°, tks, bbls .. lb.	...	.03⅝	...	.03⅝	...	.03¾

WAXES

Wax, Bayberry, bgs ..... lb.	.17½	.20	.17½	.20	.17½	.23
Bees, bleached, white 500 lb slabs, cases ..... lb.	.36	.38	.34	.38	.33½	.34
Yellow, African, bgs.. lb.	.25	.26½	.24	.26½	.21	.25½
Brazilian, bgs ..... lb.	.26	.28	.25	.28	.21½	.26½
Chilean, bgs ..... lb.	.26	.28	.25	.28	.21½	.26½
Refined, 500 lb slabs, cases ..... lb.	.28	.30	.28	.30	.27½	.28
Candelilla, bgs ..... lb.	.15½	.16	.15½	.17½	.10	.17¼
Carnauba, No. 1, yellow, bgs ..... lb.	.45	.46½	.45	.48	.35	.54
No. 2, yellow, bgs .... lb.	.44	.45	.44	.46	.34	.51
No. 2, N. C., bgs .... lb.	.40½	.41	.40	.41	.26½	.43½
No. 3, Chalky, bgs ... lb.	.35	.37	.35	.38	.21	.42½
No. 3, N. C., bgs .... lb.	.35	.37	.35	.41	.22½	.43
Ceresin, white, imp, bgs lb.	.43	.45	.43	.45	.43	.45
Yellow, bgs ..... lb.	.36	.38	.36	.38	.36	.38
Domestic, bgs ..... lb.	.08	.11	.08	.11	.08	.11
Japan, 224 lb cases ..... lb.	.08¼	.08¾	.08	.08¾	.06	.09
Montan, crude, bgs .... lb.	.10¾	.11¾	.10¾	.11¾	.10½	.11¾
Paraffin, see Paraffin Wax.						
Spermaceti, blocks, cases lb.	.22	.24	.22	.24	.19	.24
Cakes, cases ..... lb.	.23	.25	.23	.25	.20	.25
Whiting, prec 200 lb bgs, c-l, wks ..... ton	...	15.00	...	15.00	12.00	15.00
Alba, bgs, c-l, wks .... ton	..	15.00	...	15.00	...	15.00
Gliders, bgs, c-l, wks .. ton	11.50	14.50	11.50	15.00	...	15.00
Wood Flour, c-l, bgs ..... ton	18.00	30.00	18.00	30.00	18.00	30.00
Xylol, frt allowed, East 10° tks, wks ..... gal.	...	.33	...	.33	.27	.33
Coml, tks, wks, frt allowed ..... gal.	...	.30	...	.30	.26	.30
Xylidine, mixed crude, drs lb.	.36	.37	.36	.37	.36	.37
Zinc, Carbonate tech, bbls, NY ..... lb.	.09½	.11	.09½	.11	.09½	.11
Chloride fused, 600 lb drs, wks ..... lb.	.04½	.05¾	.04½	.05¾	.04½	.05¾
Gran, 500 lb bbls, wks .. lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks. .100 lb.	...	2.00	...	2.00	...	2.00
Cyanade, 100 lb drs .... lb.	.36	.38	.36	.38	.36	.41
Zinc Dust, 500 lb bbls, c-l, dely ..... lb.	...	.069	.0685	.069	.057	.0685
Metal, high grade slabs, c-l, NY ..... 100 lb.	...	5.275	5.22	5.275	4.05	5.22½
E. St. Louis ..... 100 lb.	...	4.90	4.85	4.90	3.70	4.85
Oxide, Amer, bgs, wks.. lb.	.05	.05½	.05	.05½	.05	.06¼
French, 300 lb bbls, wks ..... lb.	.05½	.07	.05½	.07	.05½	.10⅞
Palmitate, bbls ..... lb.	.22	.23	.22	.23	.21	.23
Perborate, 100 lb drs .. lb.	...	1.25	...	1.25	...	1.25
Peroxide, 100 lb drs ... lb.	...	1.25	...	1.25	...	1.25
Resinate, fused, dark, bbls ..... lb.	.09	.10	.05¾	.10	.05¾	.06½
Stearate, 50 lb bbls .... lb.	.19	.22	.19	.22	.18	.22

Current

Zinc Sulfate
Oil, Whale

	Current Market		1936 Low	1936 High	1935 Low	1935 High
Zinc Sulfate, crys, 400 lb bbl, wks ..... lb.	.028	.033	.028	.033	.028	.033
Flake, bbls ..... lb.	.032	.035	.032	.035	.032	.035
Sulfide, 500 lb bbls, delv lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
bgs, delv ..... lb.	.10½	.11½	.10½	.11½	.10½	.11½
Sulfocarbolate, 100 lb kgs ..... lb.	.24	.25	.24	.25	.24	.25
Zirconium Oxide, Nat kgs lb.	.02½	.03	.02½	.03	.02½	.03
Pure, kgs ..... lb.	.45	.50	.45	.50	.45	.50
Semi-refined, kgs ..... lb.	.08	.10	.08	.10	.08	.10

Oils and Fats

Castor, No. 3, 400 lb bbls.. lb.	.10¼	.10¾	.10¼	.10¾	.09¾	.10¾
Blown, 400 lb bbls ..... lb.	.12¼	.13	.12¼	.13	.11½	.16
China Wood, bbls spot NY lb.	.18½	.19	.14	.19¼	.094	.40
Tks, spot NY ..... lb.	.1820	.1840	.13¾	.19	.088	.35
Coast, tks ..... lb.	.18	nom.	.132	.18	.087	.24
Coconut, edible, bbls NY.. lb.	...	.10¼	...	.10¼	.04	.12
Manila, tks, NY ..... lb.	...	.04¼	.04¼	.05	.03¾	.06¼
Tks, Pacific Coast .... lb.	.03⅞	.04	.03⅞	.04⅞	.03⅜	.06
Cod, Newfoundland, 50 gal bbls ..... gal.	...	.40	...	.40	.34	.38
Copra, bgs, NY ..... lb.	.023	.024	.023	.0290	.02	.038
Corn, crude, tks, mills .... lb.	.08⅛	.08¼	.08⅛	.09½	.08¾	.11
Refd, 375 lb bbls, NY .. lb.	.11	.11¼	.11	.12¾	.11½	.14
Cottonseed, see Oils and Fats News Section.						
Degras, American, 50 gal bbls. NY ..... lb.	.05¼	.06¾	.05¼	.06¼	.04½	.06
English, bbls, NY..... lb.	.08¾	.10¼	.08¾	.10¼	.04¾	.06½
Greases, Yellow ..... lb.	.04½	.04½	.04¼	.05½	.05	.06¾
White, choice bbls, NY lb.	.04¾	.06¾	.04¾	.07¾	.05¼	.08½
Herring, Coast, tks ..... gal.	...	nom.	...	nom.	.23	.33
Lard Oil, edible, prime .. lb.	...	.14	.14	.14½	.09¾	.20½
Extra, bbls ..... lb.	...	.10½	.10½	.11	.08½	.11¾
Extra, No. 1, bbls ..... lb.	...	.08½	.08½	.09	.08¼	.11
Linseed, Raw, less than 5 bbl lots ..... lb.	...	.102	.102	.108	.091	.1130
bbls, c-l, spot ..... lb.	...	.094	.094	.10	.083	.102
Tks ..... lb.	...	.088	.088	.094	.0770	.096
Menhaden, tks, Baltimore gal.	...	.34	.34	.36	.25	.36
Refined, alkali, drs ..... lb.	.068	.072	.068	.082	.061	.082
Tks ..... lb.	...	.064	.064	.072	.055	.072
Light pressed, drs ..... lb.	.062	.064	.062	.076	.055	.076
Tks ..... lb.	...	.058	.058	.066	.049	.066
Kettle bodied, drs ..... lb.	...	.083	.083	.096	...	...
Neatsfoot, CT, 20° bbls, NY ..... lb.	..	.16¼	.16¼	.16¾	.16¼	.16¾
Extra, bbls, NY ..... lb.	...	.08¼	.08¾	.09¼	.08½	.11¼
Pure, bbls, NY ..... lb.	...	.12¼	.12¼	.12¾	.11¾	.13¼
Oleo, No. 1, bbls, NY .... lb.	...	.10½	.10½	.12½	.10¾	.14½
No. 2, bbls, NY ..... lb.	..	.10	.10	.12	.10	.13¾
Olive, denat, bbls, NY ...gal.	.73	.75	.73	.80	.82	.95
Edible, bbls, NY ..... gal.	1.60	1.90	1.60	1.90	1.55	1.90
Foots, bbls, NY ..... lb.	.08	.08½	.08	.08¾	.07⅛	.10
Oticica, bbls ..... lb.	.14¼	.15	.11	.15½	.13½	.28
Palm, Kernel, bulk ..... lb.	...	.049	.04¾	.049	...	...
Niger, cks ..... lb.	.0435	.04½	.0435	.05	.034	.05¾
Sumatra, tks ..... lb.	.03⅞	.04	.03⅞	.04	...	...
Peanut, crude, bbls, NY .. lb.	...	.08¾	.08¾	.09¼	...	...
Tks, f.o.b. mill ..... lb.	...	.08⅜	.08⅜	.09⅜	.08¾	.10¾
Refined, bbls, NY ..... lb.	.12¼	.13¼	.12¼	.13¼	.12½	.14
Perilla, drs, NY ..... lb.	.07¼	.07¾	.07	.07¾	.07¼	.10¼
Tks, Coast ..... lb.	.069	.07	.066	.074	.068	.08½
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.086	.088	.086	.088	.07½	.09
Denatured, drs, NY .. gal.	.52½	.53	.52	.56	.40	.56
Red, Distilled, bbls ..... lb.	.09⅛	.10⅛	.09⅛	.10⅝	.07⅜	.10⅝
Tks ..... lb.	...	.08¼	.08¼	.08¾	.06½	.08¾
Salmon, Coast, 8000 gal tks ..... gal.	..	.31	...	.31	.25	.35
Sardine, Pac Coast, tks ..gal.	.31	nom.	.32	.39	.24½	.37½
Refined alkali, drs ..... lb.	.068	.072	.068	.082	.065	.082
Tks ..... lb.	...	.064	.064	.072	.06	.072
Light pressed, drs ..... lb.	.062	.064	.062	.076	.055	.076
Tks ..... lb.	...	.058	.058	.066	.049	.066
Sesame, yellow, dom ..... lb.	.12¾	.13½	.12¾	.14½	.12¼	.15½
White, dos ..... lb.	.12¾	.13¼	.12¾	.14½	.12¾	.15½
Soy Bean, crude						
Dom, tks, f.o.b. mills .. lb.	...	.07½	.07½	.085	.08	.10
Crude, drs, NY ..... lb.	.081	.085	.081	.095	.086	.11
Refd, bbls, NY ..... lb.	.086	.09½	.086	.105	.091	.115
Tks ..... lb.	.08	.08½	.08	.095	.08	.10½
Sperm, 38° CT, bleached, bbls NY ..... lb.	.094	.096	.094	.101	.099	.101
45° CT, bleached, bbls, NY ..... lb.	.087	.089	.087	.094	.092	.094
Stearic Acid, double pressed dist bgs ..... lb.	.09	.10	.09	.11	.10	.12¼
Double pressed saponified bgs ..... lb.	.09½	.10½	.09½	.11½	.09	.12¾
Triple pressed dist bgs.. lb.	.11¾	.12¾	.11¾	.13¾	.12¾	.15¼
Stearine, Oleo, bbls ..... lb.	.07¾	.08	.07½	.09	.09¼	.12½
Tallow City, extra loose .. lb.	.04⅞	.05	.04⅞	.06⅝	.05⅜	.07⅜
Edible, tierces ..... lb.	...	.07	.07	.08½	.07¼	.09¼
Acidless, tks, NY ..... lb.	...	.07¾	.07¾	.08¾	.07½	.10½
Turkey Red, single, bbls .. lb.	.08	.08½	.08	.08½	.07½	.08½
Double, bbls ..... lb.	.13	.13½	.13	.13½	.12½	.13½
Whale:						
Winter bleach, bbls, NY lb.	.077	.079	.077	.081	.07	.083
Refined, nat, bbls, NY .. lb.	.073	.075	.073	.075	.064	.08¹

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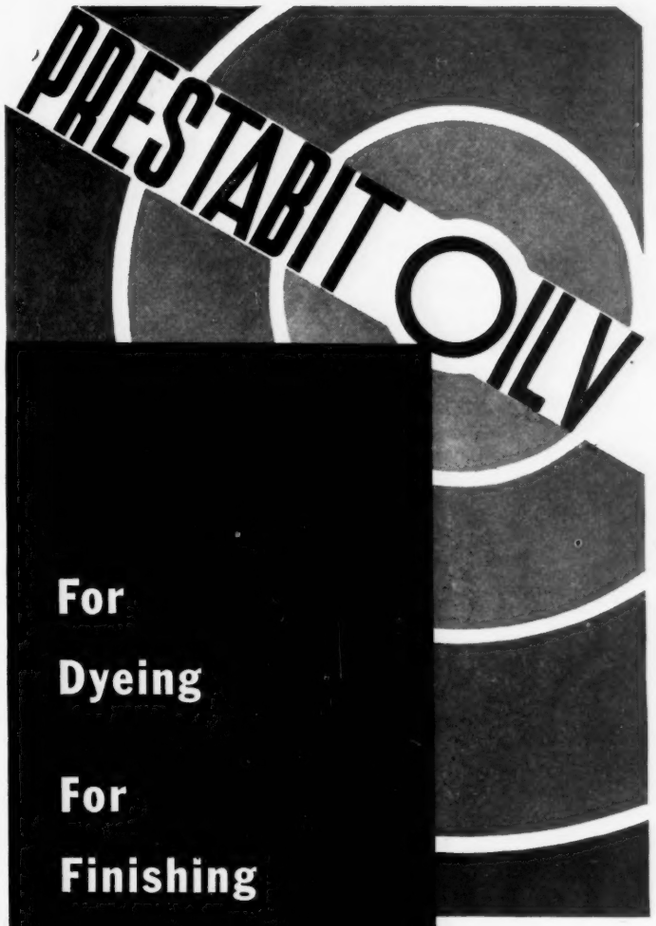

"We"—Editorially Speaking

As evidence of the conservatism of radical Wisconsin's boondoggling, Phil Hanna in the Chicago *Journal of Commerce* points out that P. W. A. is getting out 15,000 tons of lime a day which is sold to farmers at $1 a ton to sweeten that state's sour agricultural land. Very sweet indeed—but what about the lime producers?

❖❖❖❖

From a quotation in DRUG & CHEMICAL MARKETS, exactly fifteen years ago: "No, we haven't heard a rumor that the U. S. is soon to be sold by the sheriff, but, perhaps, if we wait long enough, we will hear that one, too."

❖❖❖❖

Fearful as he is of a "dirty campaign," you can hardly blame Jim Farley for trying to clean up by soaking the rich and soft-soaping the poor.

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Benjamin Levitt, author of "Industrial Soaps," this issue, takes his material for this subject from a broad background of some twenty years connection with the soap industry. During this period, he has been employed by Procter & Gamble, Swift & Co. soap works, and for the past sixteen years has been chief chemist with Charles W. Young & Co., Philadelphia, makers of industrial soaps and oils. He has contributed numerous papers to American and foreign journals, lectured on what he calls his "specialty" at many schools and colleges, and done considerable consulting work for silk mills. And he also adds, quite proudly, that he is the father of two boys.

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C. R. Caryl, a Cyanamid & Chemical assistant department sales manager, is the author of the article on phthalic anhydride in this issue. He received his B.S. from Kalamazoo College and his M.S. from Yale. He has served twelve years with Cyanamid in sales work, specializing on rubber chemicals, phthalic anhydride and other products in the varied Cyanamid line. He is known to his associates as Coleman, is married and has one son, fourteen years old. We have just been informed of his transfer to the Bridgeville phthalic anhydride plant of the company as assistant to Dr. A. O. Jaeger who is in charge of all operations there.

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A cantankerous reader writes: "After reading Dr. Snyder's 'Answers to Termite Questions' I thought that the big picture of the Eleventh Annual Banquet of the Drug and Chemical Section of the New York Board of Trade was a first class picture of a termite infestation."

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Arthur E. Gibbs, Technical Director, Pennsylvania Salt Mfg. Company, who enlightens you considerably on the subject of Cryolite, page 471, was born in Wilmington, England, and graduated from the Merchant Venturers Technical College in '94, when he entered the employ of Drake & Gorham, Electrical Engineers, London. He came to America in '98, associating himself with National Electrolytic, Niagara Falls, later being made a Director of the company. After joining Penn Salt in '04, he developed the electrolytic alkali-chlorine cell which bears his name.

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Side by side among the car cards in the New York subway "We" noticed the other day—"My Money Buys a Lot of Uneeda Biscuits"—"A Little Ammo Does a Lot"—"A Little White Rose Tea Makes a Lot." It looks a lot to us as if there were going to be a boom in real estate.

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Charles Andrew Brautlecht's present interest is an intensive study of the potato starch industry, hence his thoroughly interesting article on the subject in this issue. Dr. Brautlecht began his career as a chemist on protein and amino acid research at the Connecticut Agricultural Experiment Station in New Haven. He received his B.S. degree in chemistry from Yale in '06 and his Ph.D. in '12. His experience in chemistry embraces teaching, research, commercial and administrative work, and he has published many articles in chemical, educational and pulp and paper journals.

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At Bound Brook, N. J., are twenty acres that twenty years ago was a corn field. On that land every year for twenty years has been spent a million dollars. Today over 2000 men work there and they drive to the chemical plant where they are regularly employed in more than 950 automobiles.

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This plant at Bound Brook is typically representative of our dyestuff industry. Had it not been for the World War, which gave us a four year embargo against the supplies and commercial activities of the German Dye Trust, this industry would never have started in America and had it not been for the tariff it would never have been preserved. That industry today is jeopardized by the recent reciprocal tariff treaty with Switzerland which virtually cuts its protective duties in half.

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Leaders of our automobile and tool industries selfishly favor lower tariffs and "We" commend to their attention the above figures. They can most conservatively be multiplied by five for the entire industry. Is the "Swiss market" worth 10,000 well paid American workers, in 100 million worth of plant and equipment, driving 4,750 American cars? "We" wonder.

Fifteen Years Ago

From our issues of May, 1921

Sherwin-Williams opens office in Honolulu.

Monsanto increases common stock from $700,000 to $3,500,000.

Commercial Solvents moves from 165 Broadway to 17 East 42nd Street, New York City.

Dr. Gilbert N. Lewis receives award of Wm. H. Nichols Medal.

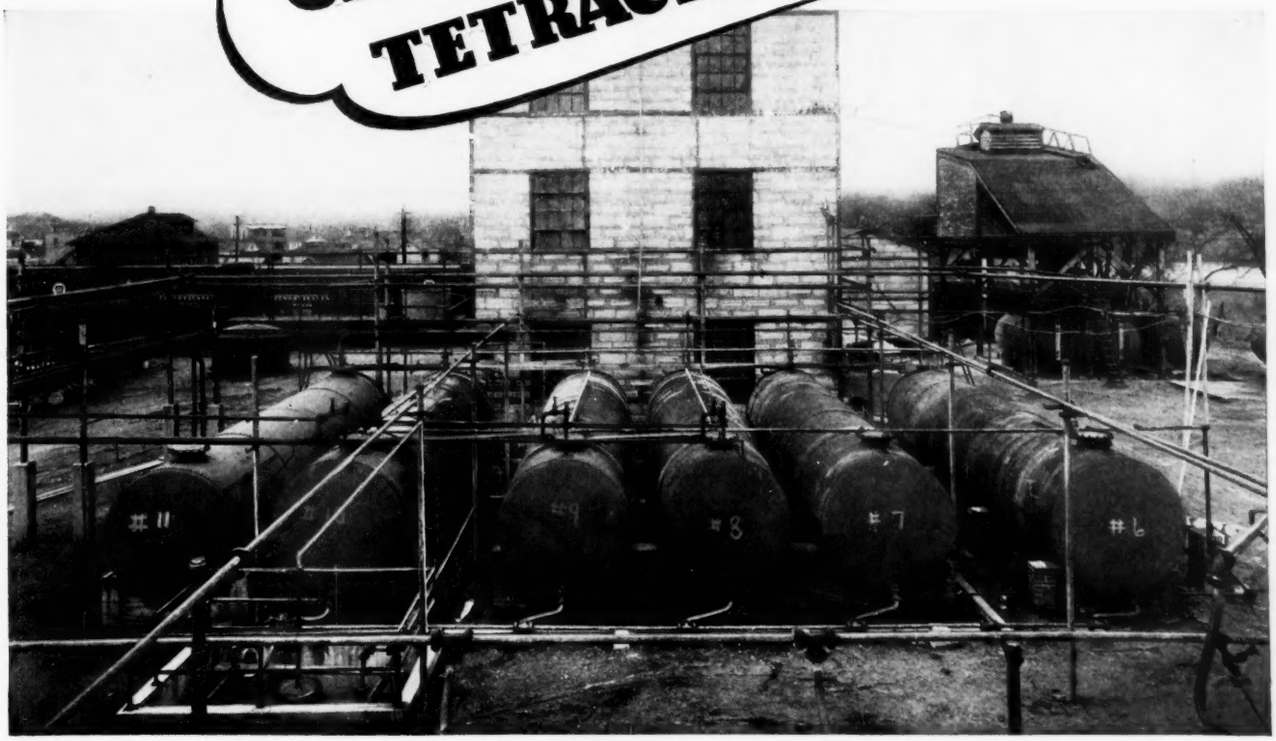
Pres. Cornish, National Lead, will sail for Europe next month, to attend Convention of International Chamber of Commerce.

E. K. Speiden, Secretary, Innis Speiden, resigns.

Equipment's Contribution to Chemical Progress

A companion volume to the historical Supplement on important chemical manufacturing companies, which we published just a year ago, will appear with the June number entitled "Equipment's Contribution to Chemical Progress." For the first time the story of chemical equipment and apparatus in America is told with a great deal of extremely valuable data regarding uses and users.

CARBON TETRACHLORIDE



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